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The Oil Security System

An Oil Import Policy for the United States

Institute of Naval Studies

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What should the United States do if some oil imports are cheaper but less secure than domestic energy production? In answer to this recurring question, the Oil Security System provides for more oil security and more imports too. It permits imports from insecure sources, either upon payment of a fee or if backed by commitments of emergency oil supplies issued by suppliers of secure oil. Such commitments, called guarantees, are obligations to sell on the market oil in an emergency from such sources as inventories, existing wells operated below capacity, capped wells, new wells drilled during the emergency, and diversions of U.S. exports of crude oil and refined products. In turn, possession of a guarantee is the qualification for receiving a fee-exempt import allowance. Both guarantees and fee-exempt import allowances would be bought and sold. Importers of oil would choose the cheaper way of importing between paying the fee and acquiring a fee-exempt import allowance. Under the Oil Security System the information on guarantees would at all times permit the government to maintain a detailed plan specifying where oil would come from and when it would be supplied in an emergency. In most situations, substituting an Oil Security System for an alternative import policy would both reduce the cost of importing oil and increase oil security in the form of emergency oil supplies.

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2. The Oil Security System is a compromise between relatively cheap and relatively secure oil. It would permit imports of oil from insecure sources in any quantity, without payment of the import fee, if such imports are backed by the guarantee of emergency oil supplies. It is discussed here as a candidate oil import policy for the United States. Preferability is addressed by comparing the cost of importing oil and the supply of oil in an emergency, when an Oil Security System is substituted for several oil import policies that have been tried or proposed. Most of the analysis is devoted to showing feasibility. One way of operating an Oil Security System is explored in detail. Answers are given to questions concerning both the feasibility and preferability of the policy.
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**CENTER FOR NAVAL ANALYSES
RESEARCH CONTRIBUTION 255**

Institute of Naval Studies

**THE OIL SECURITY SYSTEM
AN OIL IMPORT POLICY FOR THE UNITED STATES**

January 1974

Daniel H. Newlon
Norman V. Breckner

This Research Contribution does not necessarily represent
the opinion of the Department of the Navy

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ABSTRACT

What should the United States do if some oil imports are cheaper but less secure than domestic energy production? In answer to this recurring question, the *Oil Security System* provides for more oil security and more imports too. It permits imports from insecure sources, either upon payment of a fee or if backed by commitments of emergency oil supplies issued by suppliers of secure oil. Such commitments, called *guarantees*, are obligations to sell oil on the market in an emergency from such sources as inventories, existing wells operated below capacity, capped wells, new wells drilled during the emergency, and diversions of U.S. exports of crude oil and refined products. In turn, possession of a guarantee is the qualification for receiving a fee-exempt import allowance. Both guarantees and fee-exempt import allowances would be bought and sold. Importers of oil would choose the cheaper way of importing between paying the fee and acquiring a fee-exempt import allowance. Under the Oil Security System the information on guarantees would at all times permit the government to maintain a detailed plan specifying where oil would come from and when it would be supplied in an emergency. In most situations, substituting an Oil Security System for an alternative import policy would both reduce the cost of importing oil and increase oil security in the form of emergency oil supplies.

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AUTHORS' NOTE

The oil production cutbacks and embargo by certain Arab states during the winter of 1973-74 highlight an old question. Can the United States simultaneously import oil that is subject to abrupt interruption and satisfactorily protect itself against threatened or actual interruptions in such insecure imports? Our answer is yes. The *Oil Security System* presented here would permit such imports and at the same time assure adequate emergency oil supplies against the possibility of an import interruption. Other oil import policies, such as steep import tariffs or quotas, have been tried or proposed. Compared with them, the Oil Security System is superior because it would provide the United States with larger and cheaper oil supplies when world oil is flowing "normally" and would ensure in advance the availability of continuing supplies if insecure imports were abruptly restricted.

Our analysis was all but complete before the tumult in the world petroleum market of the last few months. That uproar raises some questions. Do current events fundamentally alter the nature of the long-run import question this paper addresses? Our answer is no. Do they suggest any special doubts about the appropriateness of the Oil Security System in fair weather or foul? Again the answer is no. On the contrary, the advantages of the proposed import policy if an emergency occurs should be clear for the reader who compares the effects on market supply and the response of administrative controls after the recent abrupt import restriction with the consequences outlined under an Oil Security System. Nevertheless, much confusion has been generated by the current gyrations in the world petroleum market, and much confusion surrounds the use of oil allocation and price controls domestically. For this reason we want to emphasize two points at the outset.

The first concerns import policy over the long-run in the face of world oil price hikes. With recently announced tax increases, the Organization of Petroleum Exporting Countries (OPEC) has established a current floor on the world oil price of something over \$7.00/barrel at the Persian Gulf. As a consequence of the announced production cutbacks and embargo, the price to independent buyers, unaffiliated with crude oil producing companies, jumped as high as \$17 briefly. However, in January it was already falling and the Petroleum Intelligence Weekly reported in February and early March that in auctions by Middle Eastern governments there was considerable sales resistance above \$10. Domestically, the ceiling price of "old" oil is set by the government at \$5.25. The price of "new" oil, production either from new developments or increments from already producing properties, is uncontrolled. So also is the price of output from wells producing less than 10 barrels/day.

If the cost of importing oil—the sum of the price on the world market, transportation and handling costs, and the current import fee—is so high, will there be any market in the United States in the years ahead for oil from insecure sources? If no one wants to pay the world price to import that oil, there is no conflict between the desires to have both cheap oil and secure oil. That basic issue in choosing an oil import policy vanishes.

But it will not vanish. In the absence of a deliberately tightened import restriction by the United States, such as a high tariff or low quota, there will be a large American market for Middle Eastern and North African oil indefinitely. As the production cutbacks and embargo abate, the world price will fall sharply from recent peaks. The oil price boost itself is a powerful incentive around the world to find oil and develop other energy sources. This will sharpen the latent competitive pressures among oil-exporting countries in pricing and selling oil. The current price

floor set by per-barrel taxes of oil-exporting countries may be pierced and abandoned. But new oil and other energy supplies will themselves be costly. It is beyond anyone's ability to predict with any confidence the future price and output time-profiles of oil and alternative forms of energy. Nor must one be able to do so to explore the issue at hand. If the cost of importing oil from insecure sources is below the costs of the incremental domestic outputs of oil and other energy forms that can replace all such imports, users will buy imported oil. And this will surely be the case. Only one qualification remains. This is that the U.S. government does not subsidize the development and production of energy so heavily as to reduce substantially the apparent costs to be recovered by domestic producers from buyers in the market.

This prediction about future imports applies whether or not we retain government price controls on domestically-produced oil below the world price. Price controls on domestic oil do not *by themselves* dampen the desire to buy oil at higher prices abroad when, at the controlled domestic price, there is a shortage of what domestic producers supply below the amount people want to buy. In fact, imports would be greater because the price of domestic oil was controlled. Nor do price controls on domestic production, *by themselves*, inhibit purchases at higher prices abroad. But this will be the result if price and allocation controls in the domestic market are also extended to imported oil and prevent importers from selling it at prices that permit an adequate return on investment.

This brings us to our second point. If a sharp import interruption occurs, it too can be exacerbated by just such generalized price and allocation controls. On the supply side of the market, among other effects they can reduce our ability to compete for the oil still flowing in the world market. This apparently occurred in the present emergency. There was a substantial decline in imports in December of 1973 following the production cutbacks and embargo first announced in October. A mandatory crude oil allocation program was announced in December and instituted on February 1, 1974. Refiners whose ratio of estimated crude oil supplies to refinery capacity was above the average had to sell crude oil to other companies at effective prices that were too low to make it worthwhile for either the crude-rich or crude-poor refiners to import as much oil as could be had. Imports sagged again. The effect of allocation and price controls was perverse.

The analysis in this paper includes the operation of the Oil Security System if an import interruption occurs, but it is essentially neutral on the question of adopting price and allocation controls in the event of a sudden interruption. That, we think, is a large separate question. However, that question and the operation of the Oil Security System do overlap.

If certain imports are regarded as highly insecure, the System ensures the creation and maintenance of an emergency oil supply capability that will be called on if the imports are interrupted. Deliberate rewards are continuously provided emergency oil suppliers in advance by permitting free entry, without import fee, of imports backed by commitments to sell emergency supplies on the market if an interruption occurs. If, in addition, policy is not committed in advance to price and allocation controls in case of an interruption, this would not reduce but could further increase the overall incentive to firms to maintain an emergency supply capability. They would foresee at least the possibility of further compensation, if there was an interruption, by some increase in prices for those who providently provided this capability in advance. To the extent they foresee this possibility, they will provide a still greater emergency supply capability in advance than the Oil Security System would otherwise call forth if all concerned agreed that any interruption would surely bring controls.

Beyond this, the Oil Security System, in comparison with alternative import policies that attempt to account for insecurity of some oil imports, promises a smaller shortage and therefore less upward pressure on the price of oil if an emergency occurs. In many cases there would be no shortage at all. And finally, whatever the pressure on prices as allocators of oil among users in an emergency, if disparate and detailed controls are avoided we would save ourselves from perverse effects on incentives to scour the world market for oil still available.

SYNOPSIS

THE CHOICE BETWEEN OIL SECURITY AND LOWER OIL PRICES

Until 1973 U.S. oil import policy for years had been a compromise between the goal of secure oil supplies and the conflicting goal of cheap oil supplies. Before May 1973 U.S. oil importers were severely restricted in purchases of cheaper oil abroad including oil from the Middle East and North Africa. As a consequence when most imports from this region were suddenly interrupted in late 1973 there was less disruption of the U.S. economy than would have occurred had there been no earlier limit on oil imports. But the prices of many goods for domestic consumption and export were higher for more than a decade before this emergency because the limit on imports increased the cost of gasoline, heating fuel, and other forms of energy.

Concurrently with the production cutbacks and embargo by some Arab states, the Organization of Petroleum Exporting Countries (OPEC) has temporarily diminished the conflict within U.S. import policy by raising world prices to the point that U.S. energy is now much more competitive with oil imports. If very high prices persist in the world market, even after the cutbacks and embargo disappear, the oil security issue in import policy is resolved. An import policy that minimizes reliance on oil imports would then provide the United States with both the cheapest and most secure oil.

But it is very unlikely that the major oil exporting countries will price themselves out of the U.S. market. From temporarily high levels in the winter of 1973-74, one should expect a fall in the world price of oil as these countries attempt to regain or increase sales in the United States and elsewhere. Various import policies to prevent too great a U.S. dependence on low cost foreign imports are under consideration. Quotas on imports were maintained from 1959 to 1973. These quotas could be reimposed. The President's 1973 Energy Messages announced a fee-only import policy combined with measures to simulate both domestic oil production and alternative domestic energy sources. The fee on imports could be increased to discourage imports. Senate bill S.1586 proposes a combination of publicly-owned "strategic" reserves and import regulations.

We intend to show that, given almost any fee-only import policy, import quota, or publicly-owned strategic reserve, there exists an alternative system of incentives for private firms that provides more security at the same or lower cost. Therefore, such a system should be attractive both to those who are concerned primarily with the cost of oil and those more concerned with oil security. The proposals presented here are called collectively the *Oil Security System* (OSS).

THE OIL SECURITY SYSTEM

Under the OSS importers can either pay a fee on imports or purchase insurance against the consequences of an interruption in imports. Adequate insurance consists of a commitment to the government by suppliers of secure oil to sell enough *additional* oil on the market to replace imports for a specified period. Commitments of emergency oil supplies can be based on oil from existing inventories, from unused production capacity, from accelerated development of existing leases, or from emergency production from as yet unleased land.

Note: LCdr. Albert Arcuni, Harry Gilman, and Jill Hill were particularly helpful in provoking clarity in our analysis.

For example, assume that Texaco could produce 5,000 more barrels/day (b/d) of crude oil for the duration of any plausible emergency. Texaco could guarantee an emergency oil supply of 5,000 b/d in order to acquire a fee-exempt import allowance for 5,000 b/d of crude, and then either sell the allowance to an importer or use it to exempt Texaco's own imports from the fee. The commitment of Texaco's unused production capacity ensures oil consumers in the aggregate that the total supply of oil need not be affected by a reduction in crude imports of 5,000 b/d of crude. Texaco is both able and obliged to replace the crude imports by selling this additional amount of oil on the market if directed to do so by the government.

THE OIL SECURITY SYSTEM AND COST

The OSS can provide more security than each of the alternative import policies for the same or lower cost because it offers importers and producers more options and the incentives to choose among them appropriately. Under a fee-only policy importers must pay a fee set by the government, while under the OSS the importers choose between paying the fee or buying insurance in the form of commitments of emergency oil supplies. Whenever insurance is cheaper than the fee, replacing a fee-only import policy with an OSS with the same fee reduces the cost of importing oil because importers will choose the cheaper option—the insurance.

Under an import quota the government sets a ceiling on the amount of imports. Under an equivalent OSS the government issues import allowances based on existing emergency oil supplies for the same amount of imports as under the quota. But under the OSS more allowances can be obtained by increasing emergency oil supplies. If more oil imports, backed by increased emergency supplies, are cheaper than the highest-cost domestic production, then substituting an OSS for a quota will reduce cost without reducing security.

Under Senate bill S.1586 the government specifies the amount of excess production capacity on Federal lands and the location and amount of oil stored. Under the OSS private firms compete with the government. Oil suppliers choose the amount and type of insurance offered to importers based on the amount importers are willing to pay and the cost of commitments of oil from inventories, unused production capacity, etc. If the private firms can provide insurance more cheaply than the government then importers will choose the private over the public sector, reducing the cost of importing oil. If oil suppliers compete against each other, the most efficient firms will supply the insurance.

Returning to the example, assume that it costs the government \$2 million per year to store enough oil to back 5,000 b/d of crude imports adequately. If maintaining Texaco's spare capacity of 5,000 b/d, instead of producing at maximum capacity, costs Texaco less than \$2 million per year, then Texaco could offer commitments of emergency oil supplies that cost less than government oil storage. Importers would choose to rely on Texaco instead of the government.

If there is not a genuine oil security problem, then the choices of oil suppliers and importers under the OSS would create a type of free trade. Suppose oil suppliers would maintain adequate emergency oil supplies in the absence of the OSS or any other fees and restrictions on oil imports. Then oil suppliers would maintain at least the same amount of emergency oil supplies under the OSS, where importers buy commitments from oil suppliers. Importers would then be able to buy such commitments at a very low price and, as a consequence, there would be little difference between the cost of imports under the OSS and under free trade. In contrast to that type of result under the OSS, once a quota, or an import fee, or a system of publicly-owned reserves is instituted

it tends to persist even if government intervention in the import decision is not justified on the grounds of oil security. Therefore, the OSS should be the second choice of those whose first choice is free trade.

Even if government intervention in import decisions were not justified on the grounds of oil security, some might advocate an import fee or quota to improve the future U.S. balance of payments. However, under the OSS several factors would counter the effect of an increase in oil imports on the balance of payments. U.S. exports of goods and services, in which the United States has a greater comparative advantage than in oil, would tend to increase. The size of the U.S. market for oil combined with the ability of U.S. oil producers to replace imports would reduce the bargaining power of oil-exporting countries.

THE OIL SECURITY SYSTEM AND OIL SECURITY

Allowing importers to choose between purchasing commitments and paying the import fee not only tends to reduce the cost of oil but increases oil security over an equivalent import quota or fee-only import policy. The OSS increases oil security in three ways. First, the government has a detailed plan for the replacements of oil imports before an emergency actually occurs. The plan is based on the specific commitments made by oil suppliers. Neither an import quota nor a fee-only import policy, by itself, will provide the government with the same information about oil supplies needed to develop a detailed plan. Without such information, if the government wants to allocate oil once an emergency starts, it will have to adopt stop-gap measures as in the winter of 1973-74.

Second, the capability for replacing oil imports will be greater because there will be more oil stored, more spare production capacity, and more exploration of unleased land. Under the OSS, importers would purchase commitments from oil suppliers if this would reduce their costs. The payments by importers for emergency oil supplies create an incentive for oil suppliers to increase inventories and spare capacity, and develop plans for emergency production from as yet unleased land. Under an import quota or a fee-only policy there is no such subsidy from importers for creating specified emergency supply capability, and therefore no such incentive.

Third, future domestic oil reserves would be larger. Replacing a quota or a fee-only policy with the OSS would lead to a decrease in current domestic production because the payments for commitments to supply more oil in an emergency would induce suppliers to shut-in or reduce production from high-cost fields. But the decrease in domestic production would not cause the ability to produce to fall, since the ability to produce must be maintained in order to issue commitments. A lower rate of domestic production, but the same or greater production capability, means that in a future emergency there will be more oil available under the OSS than under an import quota or a fee-only import policy.

The OSS will also provide at least as much oil security as an equivalent system of publicly-owned strategic reserves. If, for example, the government considers 365 days of emergency oil supplies adequate insurance for any conceivable emergency, then all fee-exempt imports are backed by 365 days of oil supplies under both the OSS and under the system of strategic reserves. Security will, however, cost less under the OSS because there will be a large number of oil suppliers providing emergency capability and they will devise cheaper ways of providing storage and unutilized production capacity.

OIL IMPORT POLICIES

For many years the United States imported little oil from outside the Western Hemisphere, and it could substantially replace its least secure oil imports, in case they were interrupted, from inventories and spare production capacity. Recently imports have increased rapidly until the Arab production cutback and embargo in the fall of 1973. In September of 1973, oil imports coming directly or indirectly from the Middle East and North Africa alone provided approximately 10 percent of U.S. consumption and were expected to increase to 25 percent by 1975-80.

At the same time, the known capacity of the United States to replace these imports from domestic production and from inventories, in case of an emergency, has decreased. Within the past two years domestic crude production reached a temporary peak with the entire excess production capacity for crude oil, at the prevailing price, finally placed into current production. By contrast, on January 1, 1964, total excess capacity in the United States was estimated to be 4 million barrels/day (b/d) or about 53 percent of actual domestic production. On the side of inventories, there was virtually no change between the October 1972 and October 1973 estimates of slightly over a billion barrels for total stocks of crude oil and oil products at refineries, bulk terminals, and in pipelines. With oil imports growing rapidly in the last half of the period and total consumption climbing steadily, there was a decline in inventories as a percentage of both imports and consumption. These estimates exclude some inventories in the product distribution network and inventories held at the site by users of oil products, both of which many have risen in the latter part of the period as imports rose dramatically. Nevertheless, normal inventories as a percentage of imports are expected to fall in the future as imports rise.

Prices of U.S. oil imports have also increased sharply in the past three years. World market prices have risen as a result of the growing world demand for oil and the cartel-like behavior of the Organization of Petroleum Exporting Countries (OPEC). In 1971 OPEC concluded agreements with the international oil companies providing for higher posted prices as bases for taxes levied by producing countries. The same countries are also escalating their participation in ownership of the crude oil that was typically owned by the oil company under earlier concessions. Therefore, the effective tax-paid costs to the oil companies of Persian Gulf crude oil rose from about \$1.00 per barrel a few years ago to roughly \$2.00 per barrel in September 1973. In the same period arms-length market prices of crude oil loaded at the Persian Gulf also rose from as low as \$1.40 per barrel in 1970 to the vicinity of \$3.00 per barrel in September 1973. Delivered prices of imported oil in 1973 also reflected a temporary increase in tanker rates, single-voyage tanker rates in the spot market having increased by three to four times within little more than a year before the October war. Most recently, in successive unilateral announcements in October and December of 1973, the posted price of Persian Gulf light crude was raised to over \$11.00 per barrel. This action pushed up tax-paid costs to roughly \$7.00 per barrel, a current price floor on crude oil some 3.5 times what it was last September.

Both the recent restriction of oil flows and the dramatic rise in the world price of oil were summarily inflicted upon oil consumers around the world. At first glance it might appear that this behavior of oil-exporting countries has at least done the United States the service of deciding our future oil import policy for us. It might appear now that there is reason enough for the United States to resolve the question of secure oil supplies vs. cheap oil supplies by simply placing very tight constraints on imports. These constraints might even include arbitrarily barring all insecure imports that are suddenly not so cheap anyway. But this would be against our own best interest.

We shall demonstrate that the proposals presented here, collectively called the *Oil Security System* (OSS), would provide at least as much oil security as other import policies—including a low oil import quota—, at the same cost or lower. Under many conditions, employing the OSS rather than other import policies would provide both more oil security and lower cost. The United States must make its own choice of oil import policies. There are several to consider.

CHANGES IN U.S. OIL POLICY: RECENT AND PROPOSED

Until recently the Mandatory Oil Import Control Program (MOICP) was the U.S. oil policy. Starting in 1959, the U.S. Government chose to restrict arbitrarily imports of crude oil and products, and to maintain a very high domestic price of crude oil relative to the price of imports. In effect, the U.S. Government chose to increase the price paid by U.S. consumers of oil, in order to reduce imports and thereby reduce the risks of disruption from threatened or actual interruptions in oil supplies.

This price differential was substantial. Under the MOICP oil consumers paid at times 60 percent more for their oil than the price of imported oil. Estimates place the total cost to consumers of the MOICP as high as \$6 billion per year.*

The cost to the consumer would have been even higher had the government not relaxed the ceiling on imports by creating a patchwork of exceptions to the quota. But even these exceptions proved inadequate. Under the pressure of mounting demand, particularly for low-sulphur crude, unmatched by increasing domestic supply, the President's Energy Message of April 18, 1973 abandoned the quota system.

In that message the President temporarily reduced import restrictions to a very low level in order to slow the increase in the price of oil in the United States. All import allocations outstanding under the MOICP were made fee-exempt and additional imports each year were to be admitted on the payment of a nominal fee of \$.105 per barrel of crude and \$.21 per barrel of gasoline. The announced intention was to phase out fee-exempt imports by April 30, 1980 by which time the United States would have converted to a full fledged tariff (fee) system. During the same period, the fee on crude imports was to double and the fee on gasoline imports was to triple.

The President's Energy Messages of April 18 and June 29 also propose accelerating the leasing of the Outer Continental Shelf; taking additional steps to increase domestic production of oil and other forms of energy; increasing research spending on such sources as oil shale, breeder reactors, and solar energy; and implementing a program to reduce the demand for energy.

Senate bill S.1586, introduced on April 16, 1973, offers an alternative oil policy. It declares the policy of the United States to be (a) "to create over a period of three years, and to maintain thereafter, strategic reserves of petroleum in the form of useful storage or reserve producing capacity capable of replacing all oil and gas imports from insecure sources for at least ninety days; (b) to limit imports of oil and natural gas to levels, sources, and forms that are consistent with national security, public safety, and welfare, and with the efficient functioning of the United States

**The Oil Import Question*, the Cabinet Task Force on Oil Import Control, Feb. 1970, pp. 259-263. Also, Burrows, James C. and Domencich, Thomas A., *An Analysis of the United States Oil Import Quota*, A Charles Rivers Associate Research Study, D.C. Heath & Co., Lexington, Massachusetts, 1970, Ch. 2.

economy; . . ." To these ends, S.1586 would provide for a "strategic petroleum reserve system" and oil and gas import regulation.

As outlined in the bill, the strategic petroleum reserve system would consist of three programs:

- (1) a petroleum industry storage reserve of the amount of stored petroleum importers must have available in order to be eligible for import licenses;
- (2) a petroleum industry production reserve which would create reserve production capacity by specifying maximum production, expressed as a percentage of the maximum efficient rate, from wells on oil and gas leases on Federal lands; and
- (3) a national petroleum reserve which would consist of the naval petroleum reserves and publicly-owned oil storage.

As provided in the bill, oil and gas import regulations would primarily involve classifying imports according to the risk of their total and partial interruption; requiring an import license for any imports, other than those considered to be as secure as comparable fuels of U.S. origin; exchangeability of import licenses; and employing a schedule of import license fees by class and size of imports, with the collected fees to be deposited in the U.S. Treasury as miscellaneous receipts.

ANOTHER ALTERNATIVE: THE OIL SECURITY SYSTEM

The OSS is another candidate oil import policy. In one sense it is similar to the other proposals. The OSS uses import fees, import allowances, publicly-owned oil reserves, etc., to increase oil security. But the OSS is also different from these policies in its emphasis on increasing the options open to importers and domestic oil producers.

Under the OSS importers have the option of buying a fee-exempt import allowance instead of paying the import fee. Oil suppliers have the option of acquiring fee-exempt import allowances by contracting to replace imported oil in case of an emergency.

The proof of capability to replace imported oil in an emergency consists of guarantees by suppliers of oil from inventories, unused production capacity, accelerated development of existing leases, emergency production from land that is as yet unleased, and U.S. oil exports that can be diverted back to the United States. By "guaranteeing" emergency oil supplies, oil suppliers acquire fee-exempt import allowances that are valuable to importers because they provide exemption from the import fee. The importer who buys a fee-exempt import allowance from an oil supplier is, in effect, purchasing insurance against an interruption in U.S. oil imports because in an emergency the amount of imports covered by the import allowance can be replaced. If Texaco could produce 5,000 more b/d of crude for the duration of any plausible emergency, it could guarantee an emergency oil supply of 5,000 b/d in order to acquire a fee-exempt import allowance for 5,000 b/d of crude, and either sell the allowance to an importer or use it to exempt its own imports from the fee.

In addition to the import allowances sold by oil suppliers there will be import allowances given or sold by the government on the basis of imports that would be expected to continue in any plausible emergency. The total of such import allowances would equal the total of the secure imports. If possible, the government would give each importer import allowances equal to his

secure imports. For example, assume that Shell imports 2,000 b/d of crude from Nigeria into District I, and the government estimates that Shell would be able to continue importing at least 2,000 b/d of crude from Nigeria in any plausible emergency. Under the OSS, Shell would receive a fee-exempt import allowance for the 2,000 b/d which it imports from Nigeria.

If the political costs of explicitly discriminating among oil-exporting countries are prohibitive, the government could auction import allowances for secure oil imports. For example, if the estimate of the minimum amount of imports that would remain in any plausible emergency is 4 million b/d and the government did not want to discriminate among oil-exporting countries, then the government could auction import allowances for that total.

In an emergency the companies that guarantee emergency oil supplies would be directed by the government to sell guaranteed oil on the market. If imports interrupted exceeded the amount of fee-exempt import allowances issued, the government could mobilize uncommitted oil supplies and ration, since committed or guaranteed emergency oil supplies sum up to the amount of fee-exempt imports only.

COMPARING IMPORT POLICIES

An import policy is usually compared to free trade by comparing effects on cost to consumers and security of oil supplies. Different import policies may likewise be compared with each other. Of two policies that can provide the same security the cheaper policy is preferable. We demonstrate that for any import policy tried or proposed, there exists an alternative OSS that provides as much or more oil security at the same or lower cost. Cost is defined as the amount paid for oil by the consumer of oil or oil products.

Under an import quota, the supply of imports is restricted by the government. The reduction in the supply of imports forces up the domestic price of oil and creates a gap between the price of imports and the price of oil in the United States. The size of this gap has been used to estimate the cost to consumers of the old U.S. import quota on oil. The amount of imports permitted was based on the amount of oil consumed.

Assume that an OSS replaces such an import quota. Import allowances are then acquired by oil suppliers on the basis of their existing capacity to sell emergency oil on the market in replacement of interrupted imports. Assume this initially permitted amount of imports equals the amount allowed previously under the quota. A fee is set so large that no one will import without a fee-exempt import allowance. Then the gap between the domestic price of oil and the price of imports will initially be the same under this OSS as under the quota it replaces because the amount of imports is the same under both policies. But if the price differential between imports and domestically-produced oil is larger than the cost of increasing emergency oil supplies by expanding inventories and spare production capacity, domestic firms will find it profitable to create additional emergency supplies in order to secure more fee-exempt import allowances and either use them to import the relatively cheap oil or sell them to other importers for the same purpose. Thus the ability to supply oil in an emergency will increase, the number of import allowances issued will increase, and the price of oil will fall as imports are substituted for more expensive domestically-produced oil. Eventually the gap between the price of oil and the price of imports will equal the cost of acquiring another import allowance by increasing inventories or creating more spare capacity.

Under the former MOICP the gap between the domestic price of oil and the price of imports was as large as \$1.60 per barrel imported. A gap that large would have been greater than the cost of increasing emergency oil supplies but under an arbitrary import quota there was no incentive to do so. In the future, if accumulating more emergency oil supplies should ever prove to be so expensive that substituting an OSS would cause no increase in the emergency oil supplies available under an import quota, imports would still be the same and there could be no increase in cost to the consumer. In sum the consumer could gain a great deal, but could never lose, by replacing an import quota with an OSS.

If a fee-only import policy is replaced by an OSS with the same fee, then some importers can avoid the fee on imports by purchasing enough commitments from secure oil suppliers to replace the imports in any plausible emergency. If the cost of these commitments is lower than the fee, importers will buy the commitments instead of paying the fee. Eventually the price of oil will fall, reflecting the savings from substituting emergency oil supplies for payment of the fee.

For example, assume that it costs \$1.00 per barrel to store enough oil to replace imports in any plausible emergency. Under an OSS with a fee of \$1.25 per barrel, importers would buy commitments to supply oil from inventories instead of paying the fee. Where insecure imports, under a fee-only import policy, had imposed the risk of an interruption of oil supplies when the imports were not matched by adequate emergency oil supplies, such insecure imports would be backed entirely with emergency supplies under an OSS. Since the fee is \$1.25 but the cost of storage is \$1.00 there is also a savings of \$.25 per barrel imported whenever this takes place.

This comparison seems to neglect the loss in tax revenues caused whenever an importer decides to buy commitments of emergency oil supplies instead of paying the fee. But the reduction in revenues reflects the increase in security caused by a decision to back imports with emergency oil supplies rather than pay the fee on imports. Under a fee-only import policy the fee must be paid because imports without backing impose a risk of a sudden reduction in income in some future emergency on people other than the importer of the oil. But, if imports are backed by adequate emergency oil supplies, this risk has been eliminated, so payments of the fee are no longer necessary. In other terms, the gain in security offsets the loss in tax revenue.

For the same reason, we do not include in our comparison of policies the net loss in income to some domestic oil producers if an import policy that causes a high domestic price of oil is replaced by an OSS with its lower oil price. Presumably the major justification for the higher domestic oil price is the insecurity of foreign imports. To the extent that additional emergency oil supplies reduce the insecurity of imports, the purpose of paying higher prices for domestic production disappears along with the purpose of fee payments.*

Of course, the government could finance emergency oil supplies. The government could store oil, proration wells on Federal lands, and buy up and shut in fields. In order to compare publicly-owned strategic reserves with the OSS, assume that all publicly-owned storage is financed

*Cost to the consumer is used as the measure of cost because it simplifies the analysis and because a number of economists have measured the cost of restricting imports this way. We could have used as a definition of cost the resource cost to the entire country, measured by the value of the additional domestic resources needed to replace cheaper imports with domestically-produced energy. A comparison of the resource cost to the nation of an OSS with the resource cost of each alternative import policy above would still lead to the conclusion that the change to the OSS reduces the cost of importing oil. However, the total reduction in cost would be smaller because the savings to consumers from increasing emergency oil supplies and importing more oil would be partially offset by the loss to domestic producers of a part of their income that they enjoyed at the higher oil prices.

entirely by a tax on imports. Under the OSS the importer could choose between paying the tax and thereby financing publicly-owned storage or buying commitments of private emergency oil supplies. Whenever an importer substitutes cheaper private emergency oil supplies for publicly-financed emergency oil supplies, the cost of oil security is reduced.

The OSS reduces the cost of oil security because it allows private firms to compete with the government. The government is free to do anything under an OSS that it can do under the other import policies, except that the government must allow private businesses to offer alternatives that are cheaper than payment of the fee or payment of the tax needed to finance publicly-owned reserves. If the fee or tax levied by the government on imports is below the cost of privately provided emergency oil supplies, then all importers pay the charge and the OSS duplicates the other policy. But whenever the private firms are cheaper, then replacing these policies with an equivalent OSS reduces the cost of importing oil without reducing security.

THE OIL SECURITY CORPORATION

There are a number of different ways in which importers could be allowed to choose between importing oil either with adequate insurance or by payment of a fee. Subsequent sections describe in detail one feasible form of the OSS.

Because it is not necessary to identify explicitly functions of specific government agencies under the OSS in order to show this approach is workable, all government actions affecting oil security will be taken by a hypothetical organization called the *Oil Security Corporation* (OSC) except where a different government agency is purposely specified. The powers attributed to the OSC would, of course, come from Congress and the latter would make basic decisions about the functions of the Oil Security System.

GUARANTEES—THE BASIS OF THE OIL SECURITY SYSTEM

Under the Oil Security System a company can import oil without fee if it has evidence that an interruption in such imports need not reduce the total supply of oil because the Oil Security Corporation can require oil suppliers in the aggregate to place an additional amount of oil on the market equal to the reduction in imports for the duration of any plausible emergency.

For example, assume that Exxon owns inventories of oil that it would be willing to use in an emergency. Exxon could contract with the OSC to draw down its inventories in an emergency. The contract would enable Exxon to issue a certificate we call a *guarantee*. Exxon's guarantee is proof under the OSS that in an emergency Exxon can and will sell enough oil on the market to keep an interruption in imports from reducing the total supply of oil in the United States.

Conceivably, guarantees could also be a statement of an obligation to the OSC to supply oil in an emergency by reducing consumption of oil. Companies could convert to alternative, secure fuel sources or close down temporarily during an emergency. However, we have limited our discussion of guarantees to emergency oil supplies.

DESCRIPTION

A guarantee is a statement of an obligation to the OSC, made by the issuer of the guarantee, to supply oil in an emergency from such sources as inventories, capped wells, existing wells operated below capacity, new wells drilled during the emergency, and U.S. exports of oil and oil products.*

For example, Texaco could issue guarantees if it contracted with the OSC to produce more in an emergency by increasing output from present wells. Mobil could issue guarantees if it contracted with the OSC to produce more in an emergency by accelerating drilling and other development of existing leases. The OSC could issue guarantees based on estimates of emergency production capacity from capped wells on the Naval Petroleum Reserve at Elk Hills, California. Atlantic-Richfield could issue guarantees if it contracted with the OSC to divert U.S. oil exports back to the United States in an emergency.

INFORMATION ON GUARANTEES

If the emergency oil supplies are to minimize the disruption to the U.S. economy resulting from an interruption of imports, they must be available at the time and in the place the effects of the emergency occur. Therefore each guarantee must specify:

- (1) the additional amount of oil the company or government agency issuing the guarantee could be ordered by the OSC to sell on the market in an emergency under the contract;
- (2) whether the oil was crude or refined;

*There are at least two concepts of a "capacity" rate of current production. Physical capacity is the maximum rate that could be achieved with the existing level of development and by current recovery methods. The maximum efficient rate of recovery is the engineering estimate of the largest current production achievable without reducing cumulative recovery of oil because of physical effects such as dissipation of well pressure. Physical capacity is typically larger than the maximum efficient rate.

- (3) the area in which the oil would be supplied;
- (4) the OSC's estimate of the minimum lead-time needed by the issuer of the guarantee to be able to produce the oil and transport it;
- (5) the minimum length of time that an emergency would have to last before the OSC could, under the contract, order the issuer of the guarantee to supply the oil;
- (6) the future dates on which the issuer of the guarantee could be obligated by the OSC to supply the oil.

Additional Amount of Oil

The issuer of the guarantee decides on the additional amount of oil that it is obligated to supply in an emergency if ordered to do so by the OSC. In the previous examples, assume that Exxon decides that it could supply 30 million barrels of gasoline from its inventories; Texaco decides that it could produce 5,000 more b/d of crude by operating its wells at capacity; Mobil decides that it can supply 30,000 more b/d by drilling new wells; and Atlantic-Richfield decides it could supply 10,000 b/d more to the United States by reducing its exports of oil to foreign customers.

But companies are not free to guarantee any amount of oil they want. The OSC checks the amount of oil guaranteed after the guarantee is issued. Whenever the OSC determines that a company overestimated emergency oil supplies in the past, then the company must pay a fine greater than the sum of the revenue secured from overestimating the guarantee and the interest on the revenue. The OSC could use future monthly reports of inventories by Exxon to determine whether or not Exxon could have been able to reduce its inventories by 30 million barrels of gasoline without seriously affecting day-to-day operations. The OSC could require Texaco to operate its wells at capacity during test periods in order to determine whether or not Texaco could have produced 5,000 more b/d.

If it appears that it might be impossible to test definitively a company's claim in the future or the company has seriously and repeatedly overestimated emergency oil supplies in the past, the OSC sets a ceiling on the amount of oil that can be guaranteed. For example, assume that Mobil plans to drill new wells and increase production by 30,000 more b/d by December of next year but that Mobil will not agree to commit itself to drill these wells by December of next year as a test of its guarantee. The OSC could use the data from the other wells on Mobil's leases, and the location of the wells Mobil would drill in an emergency, to determine a ceiling on the amount Mobil may guarantee.

The ceiling can also reflect political considerations. Assume that the OSC places a ceiling of 15,000 b/d on the amount of oil that Atlantic-Richfield can guarantee. Although Atlantic-Richfield exports more than 15,000 b/d, the U.S. government is unwilling to risk the political repercussions of cutting off all these exports to supply the United States in an emergency.

Refinery Capacity

Emergency crude oil supplies could back crude imports, since an interruption of crude imports releases the same amount of refinery capacity needed to refine the emergency oil supplies. But if the imports interrupted are refined overseas, the United States might be unable to refine its

emergency crude oil supplies. The OSC requires companies issuing guarantees to specify whether or not the emergency oil supplies need to be refined, in order to take into account the refinery capacity needed in an emergency. In the examples, Exxon issues a guarantee for refined oil for its inventories of gasoline and Texaco issues a guarantee for crude for its spare production capacity from existing wells.

The Minimum Lead-Time for the Area

The OSC estimates of the *minimum lead-times* on the guarantees reflect the difficulties each company and government agency issuing guarantees will encounter in producing the oil, and the ability of the transportation system to handle the re-routing of oil caused by the substitution for imports of domestically produced oil and oil from inventories.

For example, it might take at least 3 months to start producing from Elk Hills in District V. The capped wells have to be reopened. Gathering lines have to be built. The oil has to be transported from Elk Hills to refiners in District V.

The minimum lead-time also depends on the size of the area in which the company would supply oil in an emergency. Exxon can supply gasoline from its inventories in Districts I-II to customers in Districts I-II in a matter of days since the inventories are located near the refineries that now use imports. Therefore, Exxon issues a guarantee for Districts I-II with no minimum lead-time. But assume that transporting this gasoline to District IV would take close to a month. If Exxon wanted to include District IV on its guarantee, the minimum lead-time for the guarantee would have to be 1 month.

The minimum lead-time also reflects political considerations. Atlantic-Richfield could shift exports back to the United States in a matter of days. But the U.S. government would cut off exports only as a last resort where U.S. oil imports had been interrupted for a long period of time and the countries receiving the exports had time to shift to alternative energy sources. In the examples the OSC is assumed to set the minimum lead-time on Atlantic-Richfield's guarantee at 10 months.

Minimum Emergency Length

The *minimum emergency length* is the minimum time that an emergency would have to last before the issuer of the guarantee can be compelled to supply the oil guaranteed.

The minimum emergency length must be at least equal to the minimum lead-time or else the company would not be able to supply the oil because it would have insufficient time to produce the oil and transport it to customers. But the issuer of the guarantee might choose a minimum emergency length that was longer than the minimum lead-time.

Companies and government agencies at times risk considerable inconvenience and expense by issuing guarantees. The government risks having to uncap wells and construct a gathering system at Elk Hills. Mobil risks having to drill wells before it planned to drill them. Exxon risks having to draw down inventories of gasoline. Atlantic-Richfield risks being forced to cut off overseas customers.

The issuer of the guarantee can reduce this risk by increasing the emergency length on his guarantee. For example, although oil from Elk Hills could be supplied 3 months after an emergency starts, the OSC sets the minimum emergency length at 9 months. An emergency must last at least 6 months before the start of expenditures needed to reopen Elk Hills. By choosing a minimum emergency length that is longer than the minimum lead-time, the use of Elk Hills is limited to the most protracted and serious emergencies.

Of course, the longer the minimum emergency length on a guarantee, the less valuable the guarantee becomes as a form of insurance. This point will be explored further in the section, "The OSS In The Absence Of An Emergency."

Future Dates and Replacement Dates

The issuer of the guarantee must specify the *future dates*, i.e., the calendar dates in the future on which he could be directed by the OSC to supply oil in an emergency. If the company issuing the guarantee expects to be able to supply the oil any time in the future, then it could issue an open-ended guarantee. For example, assume that Exxon stores gasoline for the sole purpose of issuing guarantees. By January next year, Exxon expects to have accumulated 30 million barrels of gasoline that it will not need except in case of an interruption of imports. Exxon guarantees gasoline in an emergency starting any time in or after January next year.

But normally future dates reflect limitations on the ability of the issuer of the guarantee to supply oil. In the examples, Mobil plans to develop its leases by December next year. Mobil cannot increase production in an emergency by accelerating the development of existing leases if these leases are fully developed. In this example, Mobil's guarantee would have to specify that Mobil would not supply oil in an emergency after November of next year.

The issuer of the guarantee might be able to supply oil on certain future dates, but might be unwilling to risk being forced by the OSC to supply the oil. In the same example, Mobil might be able to increase production in January of next year but be unwilling to risk having to do it in an emergency because of the expense of drilling the wells so soon. Mobil could specify that it would not supply oil in an emergency by drilling new wells on existing leases before the beginning of February.

Companies often hold inventories they expect to use at some date in the future. If a company depleted such inventories in the beginning of an emergency, it would have to buy on the market the oil it would have normally taken from its inventories. If the OSC is to assure that total supply will be unaffected by an interruption in imports then it must know when the oil used from this inventory must be replaced in an emergency.

Except for open-ended guarantees, the future dates on guarantees based on inventories must also include a *replacement date*, i.e., the date on which the company must replace the oil if supplied earlier from its inventories during an emergency. For example, Union owns an inventory of 1¾ million barrels of crude in January next year that they do not anticipate using until December. Union can issue a guarantee for this inventory for January through November next year, but if it does so it must also specify a replacement date of December on the guarantee. Otherwise, it will be penalized by the OSC for issuing a guarantee on oil that it needed for normal day-to-day operations. Any importer using the guarantee issued by Union must have additional guarantees showing where the oil will come from that will offset the 1¾ million barrels of oil that Union will demand in December if its inventories are depleted earlier in an emergency.

In sum, the future dates on a guarantee describe the period of time that a company can be ordered by the OSC to supply oil in an emergency. The replacement date on a guarantee based on inventories describes the date that additional emergency oil supplies will be needed to replace oil if taken from inventories by the terms of the guarantee earlier in an emergency.

Hypothetical Examples

The hypothetical examples used to illustrate different features of the guarantees are described here in full and summarized in table 1.

(1) Exxon contracts with the OSC to supply gasoline from its inventories in Districts I-II in an emergency. The OSC does not place a ceiling on the amount that Exxon can guarantee because Exxon has never seriously overestimated emergency oil supplies in the past and the OSC can check in the future to determine whether reducing Exxon's inventories by the amount of gasoline guaranteed would have affected Exxon's day-to-day operations. The OSC estimates that Exxon would need only a few days to transport oil from its inventories to customers in Districts I-II, so the minimum lead-time is, in effect, zero.

Exxon is willing to risk being ordered to supply gasoline at the start of an emergency, so the minimum emergency length would be zero. Once the gasoline is stored at the beginning of January next year, Exxon does not expect to use the gasoline in these inventories except in an emergency. Therefore, the future dates are open-ended.

Based on the contract, Exxon issues a guarantee for 30 million barrels of refined oil deliverable immediately if ordered by the OSC to supply consumers in Districts I and II in an emergency any time in or after January of next year.

(2) Union Oil contracts with the OSC to supply crude from its inventories in District V in an emergency. The OSC does not set a ceiling on Union's guarantees. It fixes the minimum lead-time at approximately zero. Union is willing to risk being ordered to supply crude oil from its inventories at the start of an emergency so it chooses a minimum emergency length of zero. Union anticipates that by December of next year it will need the guaranteed oil for working inventories, so it does not guarantee the oil beyond November. Also, if the oil is supplied during an emergency it must be replaced by December even if the emergency continues. Union chooses future dates from January to November and specifies a replacement date of December. The guarantee issued by Union is for 1¼ million barrels of crude deliverable immediately if ordered by the OSC to supply refiners in District V in an emergency starting any time in January to November of next year with a replacement date of December.

(3) Texaco contracts with the OSC to supply crude from unused production capacity in an emergency. Since Texaco agrees to produce at capacity in November and December of next year and this test will enable the OSC to check Texaco's guarantee, the OSC does not limit the amount of oil Texaco can guarantee. The minimum lead-time is zero because the emergency oil supplies come from wells now producing at less than capacity and oil produced from these wells takes only a few days to reach refineries in Districts I-III. However, to reduce the risk of having to produce at capacity, Texaco chooses a minimum emergency length of 2 months.

Texaco guarantees 5,000 b/d of crude deliverable, if ordered by the OSC, to supply refiners in Districts I-III any time in January through October of next year in an emergency lasting at least 2 months before Texaco can be directed to supply the oil.

TABLE 1

SUMMARY OF HYPOTHETICAL GUARANTEES

| Issuer of guarantee | Petroleum District | Type of guarantee | Future dates | Minimum emergency length | Minimum lead-time | Amount | Remarks |
|----------------------------|--------------------|---|-----------------------|--------------------------|-------------------|--------------------|---|
| Exxon | I-II | Refined oil inventories (gasoline) | Jan-(open) | 0 | 0 | 30 million barrels | Open-ended. Replacement of inventories not required by guarantee. |
| Union Oil | V | Crude inventories | Jan-Nov (replace Dec) | 0 | 0 | 1½ million barrels | Replacement of inventories required by Dec of next year. |
| Texaco | I, II, III | Unused production capacity | Jan-Oct | 2 months | 0 | 5,000 b/d | |
| Mobil | I, II, III | Accelerated development of leases | Feb-Nov | 1 month | 1 month | 30,000 b/d | OSC ceiling of 30,000 b/d because Mobil will not test. |
| OSC (Elk Hills Petro Res.) | V | Production from shut-in capacity (capped wells) | Jan-Dec | 9 months | 3 months | 160,000 b/d | |
| Atlantic-Richfield | I thru V | Diversion of crude exports | Dec | 10 months | 10 months | 10,000 b/d | OSC ceiling of 15,000 b/d due to political impact. |
| Sun Oil | I thru IV | Production from unleased land (lease rights) | Jan-(open) | 10 months | 6 months | 4,000 b/d | OSC sets emergency lease time at 4 months. Open-ended. OSC ceiling of 5,000 b/d based on geological and geophysical data. |

(4) Mobil contracts with the OSC to accelerate the development of existing leases in an emergency. The OSC estimates that accelerated development would probably increase Mobil's production by 30,000 b/d of crude based on Mobil's current production from its leases. Mobil cannot guarantee more than 30,000 b/d because Mobil will not agree to develop its leases fully by a fixed date in the future, although it tentatively plans to finish the development of its leases by the end of November next year. The OSC estimates that Mobil would need 1 month to drill the additional wells, expand its gathering system, and transport the oil to consumers in Districts I-III.

Mobil is willing to risk accelerating development at the start of an emergency so it selects a minimum emergency length equal to the minimum lead-time of 1 month. Mobil is unwilling to risk being forced to produce more from its leases before February. Mobil will be unable to produce more in an emergency after November because its leases will probably be fully developed.

Mobil guarantees 30,000 b/d of crude deliverable on orders from the OSC to refiners in Districts I-III any time in February through November of next year in an emergency lasting at least 1 month before Mobil can be directed to supply more oil from its existing leases.

(5) The OSC issues a guarantee for 160,000 b/d of crude deliverable to refiners in District V any time in January through December next year in an emergency lasting at least 9 months before the government starts supplying oil from the Naval Petroleum Reserve at Elk Hills. Although it would take 3 months to reopen the wells at Elk Hills, the OSC chooses a minimum emergency length of 9 months to reduce the risk that the government would have to develop the fields.

(6) Atlantic-Richfield contracts with the OSC to divert some of its exports of crude back to the United States in an emergency. The OSC requires Atlantic-Richfield to let its overseas customers know at least 10 months in advance when their oil will be cut-off. Although Atlantic-Richfield exports 20,000 b/d of crude, the OSC estimates that no more than 15,000 b/d could be diverted to the United States without creating unacceptable political problems for the United States overseas. Atlantic-Richfield chooses to guarantee 10,000 b/d instead of the 15,000 b/d ceiling set by the OSC and limit the future date to December of next year to reduce the risk of being forced to cut-off its overseas customers.

Based on the contract, Atlantic-Richfield issues a guarantee for 10,000 b/d of crude deliverable to customers in Districts I-V in December next year in an emergency lasting at least 10 months before Atlantic-Richfield can be ordered by the OSC to shift oil exports back to the United States.

GUARANTEE RIGHTS FOR UNLEASED PUBLIC LAND

Description

The prospect of the U.S. government leasing large tracts of land in response to an embargo would have considerable deterrent value against a long embargo. First, during the embargo, the increase in production caused by leasing the land would replace some of the imports. Second, after a long embargo, oil-exporting countries would find that they had forfeited a large share of the U.S. market for their oil imports by forcing the U.S. government to lease land that would ordinarily have remained unleased.

The Oil Security System encourages the oil industry to develop the means to produce from unleased land in an emergency by allowing companies to issue guarantees for unleased land. We call

a contract a *guarantee right* if it entitles a company to issue guarantees for emergency production from unleased land.

Guarantee Rights Auction

On request by one or more companies the Department of Interior must auction off the guarantee right for any tract of public land to the highest bidder capable of producing from the land in an emergency. If there is a risk of significant damage to the environment from producing oil, then the company acquiring the guarantee right must pay for an environmental impact study and hold public hearings before issuing guarantees. The study and the public hearings are used by the OSC to determine the *emergency lease time*, i.e., the minimum length of time an emergency must last before the OSC can lease the land for production.

The emergency lease times assigned guarantee rights rank the public lands, determining which tracts of land should be leased first in an emergency. The OSC would assign the longest emergency lease times to those tracts where production would cause the greatest environmental damage. For example, the Wilderness Areas could have emergency lease times so long as to make production there inconceivable. On the other hand, the OSC would assign low emergency lease times to tracts where production would cause little environmental damage, or the benefit from the amount of oil that could be produced and the location of the oil would tend to override the cost of the environmental damage in an emergency.

The OSC would set a ceiling on the amount of oil that could be guaranteed by the guarantee right holder based on geological and geophysical data and, if permitted by the guarantee right, exploratory drilling. The OSC would estimate the minimum lead-time required to develop the unleased land. The minimum emergency length would have to be greater than the sum of the minimum emergency lease time and the minimum lead-time in order to give the OSC time to lease the land and the company time to develop the lease and transport the oil.

The holder of the guarantee right to a tract of land can sell or exchange it with OSC approval. If the Department of Interior wants to lease the land, then it can buy back the guarantee right and lease the land.

Hypothetical Example

Sun Oil nominates a tract of land in the Gulf of Mexico for possible emergency production. The Department of Interior auctions the guarantee right for the tract and Sun Oil is the highest bidder. Sun Oil contracts with the OSC to produce oil in an emergency by drilling new wells on unleased land in the Gulf of Mexico.

Sun Oil pays for an environmental impact study by the OSC. Public hearings are held by the OSC on the guarantee rights for this tract and other tracts in the same area. The OSC decides that this land should only be leased in emergencies that last at least 4 months.

Sun Oil submits geophysical and geological data to the OSC. Tracts of land with this type of data produce after development on an average 5,000 b/d. The OSC sets a ceiling on Sun Oil of 5,000 b/d of crude. The OSC estimates that Sun Oil would need 6 months to drill enough wells and construct gathering lines to supply 5,000 b/d to refiners in Districts I-IV.

Sun Oil issues a guarantee for 4,000 b/d of crude for Districts I-IV any time in or after January next year in an emergency lasting at least 10 months. Sun Oil guarantees 4,000 b/d instead of the OSC estimate of 5,000 b/d because Sun does not want to risk being fined in the future for overestimating its ability to produce.

THE OIL SECURITY SYSTEM IN THE ABSENCE OF AN EMERGENCY

THE IMPORT FEE

Under the OSS importers must pay a per-barrel fee on all oil imports not covered by a fee-exempt import allowance. This fee on imports is intended to account for the possibility of an interruption in oil imports, and the consequences for the economy of such an interruption if there are inadequate emergency oil supplies. Under a security-oriented import policy, the government should pick an import fee that reflects the cost of the risk of an interruption in imports, so that this cost will be taken into account by oil consumers. Then one who chooses to consume imported oil with inadequate alternative oil supplies bears the full cost of his action.

The Cost of the Risk of an Interruption in Imports

Estimating the cost of the risk of an interruption in imports requires estimates of the probabilities of the different future events that might cause U.S. oil imports to be interrupted. Specifically, the OSC would list all the different major emergency scenarios that could suddenly reduce U.S. oil imports, such as a war between Iran and Iraq, an embargo of the United States by Saudi-Arabia, a blockade of the Persian Gulf by the USSR, etc. In each case the OSC would attempt to estimate the probability that the emergency would take place in the future and the likely reduction in U.S. oil imports if the emergency did take place.

The OSC would also have to estimate the impact on the U.S. economy of each plausible decrease in oil imports. Specifically, the OSC would attempt to estimate such things as the reduction in the Gross National Product, the increase in prices, and the increase in unemployment that could be caused by each plausible interruption of U.S. oil imports. The OSC would estimate how much it would have to spend to mobilize oil supplies, ration, and force, where possible, conversions to alternative, secure fuel sources in each emergency.

Finally, the OSC would have to pull together the estimates of the probabilities of interruptions and the estimates of the negative consequences for the U.S. economy of these interruptions into an overall estimate of the cost to the U.S. economy, per barrel of imports, of the risk of an interruption in imports.

Companies importing oil refined overseas must pay more than companies importing crude because there is a double risk attached to such imports. The United States may not have adequate supplies of crude oil to replace the imports in an emergency or, if the crude is available, the United States may not have enough additional refinery capacity.

In later discussions we assume, for illustrative purposes, that the OSC estimates it is worth \$.21 per barrel of crude imports and \$.63 per barrel of gasoline imports to avoid the risk that the Gross National Product will fall, unemployment will increase, prices will rise, the government will have to ration oil supplies, etc., because U.S. imports of crude and gasoline were interrupted.*

*These fees will be adopted after the MOICP is gradually phased out. Currently the fees are \$.105 per barrel of crude imports and \$.21 per barrel of gasoline imports.

Insurance Premium

Of course, taxing imports raises the price of oil and probably slows the growth of the U.S. economy by increasing the production costs of all goods and services that require inputs of oil or oil products. This cost can be viewed as an insurance premium paid by U.S. consumers and producers to insure against the possibility that by not taxing imports the U.S. economy's growth could be even slower, the prices higher, unemployment larger because of repeated interruptions in U.S. oil imports. In the previous example, the OSC estimates that it is worth forcing oil importers to pay \$.21 per barrel more for crude and \$.63 per barrel more for gasoline now in order to avoid the possibility of oil consumers having to pay several dollars more for crude and gasoline from any source in an emergency.

Choosing the best insurance premium is a matter of judgment. The estimates of the probabilities of the different emergency scenarios, the negative consequences to the U.S. economy of an interruption in oil supplies, and the amount that should be paid to avoid the risk of these consequences will differ from person to person. Some may feel that the probabilities of the different types of emergencies are slight, that the U.S. economy could adjust to large interruptions in oil supplies at little cost to consumers, and that they would prefer to gamble on no interruption in oil imports even if there is a sizable probability of such an interruption. Others may feel that the probabilities of interruptions in oil imports are large and growing, that the U.S. economy could adapt to an oil shortage only at great cost to consumers, and that it is preferable to avoid risks even if the costs of insurance are high and the risks insured against are slight.

Under the OSS, judgment about the import fees will, wherever possible, reflect public opinion. The OSC could be required to publish its studies of different emergency scenarios, which would include probabilities of interruptions of oil imports, the negative consequences to the economy of these interruptions, and the risk premium the OSC feels consumers are willing to pay, if publication would not create significant international political problems. Outside analysis and commentary could force the OSC to change its estimates if the judgment of the oil policy-makers in the OSC were significantly different from informed public opinion.

RESTRICTIONS ON FEE-EXEMPT IMPORT ALLOWANCES

An interruption in imports need not cause higher prices, unemployment, etc., if the imports can be replaced from emergency oil supplies. Therefore, imports that can be replaced should be fee-exempt.

In the examples, imports could be replaced in an emergency by drawing down the inventories held by Exxon and Union Oil, increasing production from wells owned by Texaco, drilling new wells on Mobil's leases, uncapping wells at Elk Hills, diverting some of Atlantic-Richfield's U.S. oil exports back to the United States, and Sun Oil's production from unleased land in the Gulf of Mexico. The OSC should give fee-exempt import allowances for the imports that these emergency oil supplies can replace because providing the replacement capability is an appropriate form of insurance.

Each owner of guarantees can apply for a fee-exempt import allowance. The fee-exempt import allowance would specify:

- (1) how much oil imports would be fee-exempt;
- (2) when the imports will arrive;

- (3) where the imports will either arrive or be used; and
- (4) whether or not the imports have to be refined in the United States.

The fee-exempt import allowances can be bought and sold as long as the importer eventually using an allowance complies with the restrictions on the allowance.

Amount of Fee-Exempt Imports

During any month, imports can enter the United States under fee-exempt allowances exchanged for guarantees as long as these imports can be replaced from emergency oil supplies for that month and all succeeding months during the worst plausible interruption of imports. For example, Exxon issues a guarantee for 30 million barrels of refined oil deliverable immediately any time in or after January of next year. Assume that the worst plausible emergency would last 1 year. The OSC gives the owner of Exxon's guarantee a fee-exempt import allowance for an average of 82,192 b/d in January of next year since Exxon can replace these imports from its inventories in January and continue to supply oil afterwards for each month in the worst plausible interruption of imports.*

Date Imported

Fee-exempt imports can enter the United States whenever they can be replaced from emergency oil supplies for each month in the worst plausible interruption of imports. In the previous example, the owner of Exxon's guarantee received a fee-exempt import allowance for January of next year because Exxon could replace the imports, if need be, in each month from January to December.

Fee-exempt import allowances could be used a few months before or after the month specified on the allowance in order to permit seasonal variations in fee-exempt imports.

The Area

Fee-exempt imports can enter the United States or be used in the United States wherever the imports can be replaced from emergency oil supplies. In the example, the fee-exempt import allowance given to the owner of Exxon's guarantee would specify that the fee-exempt imports have to arrive or be used in Districts I-II. If the fee-exempt imports were suddenly interrupted and the imports were supposed to arrive in Districts I-II, then Exxon can replace the imports immediately. If the imports were supposed to arrive in another District but were going to be used in Districts I-II, then Exxon can immediately start supplying the gasoline to consumers in Districts I-II.

Refined or Crude Imports

Fee-exempt imports of crude can enter the United States if backed by emergency oil supplies of crude or refined oil. An interruption of a given amount of crude imports releases the same amount of refinery capacity. In case of crude emergency oil supplies, the OSC can direct the owner

*In the worst plausible emergency in January of next year imports would be interrupted from January to December. Exxon's guarantee enables the OSC to order Exxon to supply an average of 82,192 b/d for each month next year. In this worst case Exxon's inventory of 30 million barrels of gasoline would be exhausted just as the emergency ends in December. Exxon would then be free to rebuild its inventories.

of the supplies to replace the imports at the refineries. If the emergency oil supplies are already refined, then the OSC can order the supplies directly to the consumers of oil products.

Oil refined overseas can be imported into the United States without fee if backed by emergency supplies of refined oil. If the imports interrupted are the same oil products as the emergency oil supplies, then the owner of the supplies can replace the imports directly. If imports of other oil products are interrupted, then the owner of the supplies can sell the oil products to consumers, freeing domestic refineries to change the production mix in favor of the oil products that used to be imported.

In the examples, Exxon can request a fee-exempt import allowance for either crude or refined oil, since Exxon could draw down its inventories of gasoline to replace imports of either gasoline or crude. If another oil product such as residual fuel oil were in short supply, then Exxon could supply gasoline to U.S. consumers, enabling domestic refineries to produce more residual fuel oil and less gasoline.

Oil refined overseas can be imported into the United States backed by emergency supplies of crude if there is sufficient excess domestic refinery capacity to refine the crude emergency oil supplies in any plausible emergency. In the examples, the owner of Texaco's guarantee for 5,000 more b/d in Districts I-III would receive import allowance for imports refined overseas if there would be enough refinery capacity in Districts I-III to refine all of the oil now refined domestically in these districts and the additional 5,000 b/d that Texaco would produce in an emergency by operating its wells at capacity.

EMERGENCY SUPPLY PERIOD

The amount of fee-exempt imports depends on what we call the *emergency supply period*, the number of days of oil supplies the OSC feels are needed for adequate insurance against any plausible interruption of imports.

The emergency supply period is based, in part, on the maximum length of time that a plausible emergency could last. For example, the OSC would study the length of time that Arab oil exporting countries could be expected to embargo the United States in case of another Arab/Israeli war. The OSC could examine the dependence of Arab countries on manufactured exports from the United States and the likelihood that these countries would end the embargo because they could not obtain enough exports. The OSC could examine the vulnerability of these countries to military intervention by the oil-consuming countries and the probability that they would end the embargo because of the threat of military occupation of Arab oil fields.

The emergency supply period is also based on the maximum amount of oil needed to replace imports. An embargo by Saudi-Arabia of the United States for a few months would be more serious than an embargo of the United States by Iraq for a few years, since the United States imports much more oil from Saudi-Arabia.

Finally, the emergency supply period should not be longer than the time it takes the U.S. economy to transition from reliance, in part, on oil imports vulnerable to interruption, to dependence only on secure imports and domestically produced oil, coal, natural gas, etc. The emergency supply period should not be longer than the transition period because it is only the

costs during the transition period caused by the suddenness of the interruption of imports that justify government intervention on the grounds of oil security.

For example, assume that by taxing imports the U.S. government would increase the price of gasoline by \$.63 per barrel and that, by failing to tax imports, the U.S. government risks an increase in the price of gasoline of at most \$.63 per barrel due to an interruption of imports. Under these conditions taxing imports to keep the price of gasoline from increasing is akin to burning down your house in order to avoid the risk that your house might burn down.

In the examples in the rest of this section we will assume that the emergency supply period is one year. This emergency supply period is strictly illustrative. The Senate bill S.1586 proposed creating strategic reserves capable of replacing all oil and gas imports from insecure sources for at least 90 days and we could have just as easily assumed an emergency supply period of 90 days.*

FEE-EXEMPT IMPORT ALLOWANCES FOR GUARANTEES

As mentioned earlier, the amount of fee-exempt imports entering the United States under fee-exempt import allowances backed by guarantees equals the amount of imports that can be replaced from emergency oil supplies during the first month and all succeeding months during the worst plausible interruption of imports.

Allowances for One Guarantee

In terms of a specific guarantee, the guarantee owner is entitled to fee-exempt imports equal to the maximum average daily rate of imports that the issuer of the guarantee can be ordered to replace for each month in the emergency supply period. Since the emergency supply period is assumed to be 1 year and Exxon could supply an average of 82,192 additional b/d of gasoline from its inventories for each month from January of next year to December of next year, the owner of Exxon's guarantee would receive a fee-exempt import allowance for at least an average of 82,192 b/d of refined or crude oil imports in January of next year.

But Exxon can be ordered to supply oil any month on or after January of next year. Therefore, the owner of the guarantee is entitled to a fee-exempt import allowance for more than 1 month. The owner of the guarantee issued by Exxon could receive a fee-exempt import allowance for an average of 82,192 b/d of refined oil imports for each month next year, since, for any month next year, if imports were interrupted, the OSC could order Exxon to supply on average an additional 82,192 b/d for each month in an emergency supply period of 1 year.

Allowances for More than One Guarantee

Some guarantees cannot, by themselves, cover imports for the entire emergency supply period because of the dates and the minimum emergency lengths specified on the guarantees. In the examples, Mobil issues a guarantee for 30,000 b/d of crude deliverable to refiners in Districts I-III any time in February through November of next year in an emergency lasting at least 1 month before Mobil can be ordered to supply oil by accelerating the development of its leases. If imports are interrupted in January of next year, the OSC will be unable to order Mobil to supply oil

*We discuss the effects of changing the emergency supply period on p. 43. We also show that under the OSS there will be more information available to choose an emergency supply period than under S.1586. See p. 41.

because Mobil's guarantee is restricted to February through November of next year. If imports are interrupted in February, the OSC will be unable to order Mobil to supply oil until March because of the minimum emergency length of 1 month.

If an importer wants a fee-exempt import allowance for a period of time not completely covered by an individual guarantee, the importer can combine guarantees to cover imports for the entire emergency supply period. An importer could combine Exxon's and Mobil's guarantees for a fee-exempt import allowance for an average of 107,000 b/d of imports in January of next year for Districts I-II because the 2 guarantees together enable the OSC to replace these imports in an emergency starting in January and lasting the length of the emergency supply period.*

If the replacement date on a guarantee falls inside the emergency supply period, then the other guarantees must supply enough oil to replace the oil on the guarantee with the replacement date. This provision enables the OSC to replace both imports interrupted and inventories used in the beginning of a protracted emergency. In the examples, an importer owning Union's guarantee and the guarantee for the Naval Petroleum Reserve at Elk Hills could obtain a fee-exempt import allowance for an average of 30,000 b/d of crude imports for January of next year into District V. If imports of 30,000 b/d of crude were interrupted in January of next year, Union could draw down its inventories in the beginning of the emergency until the OSC could order enough production from Elk Hills to replace imports of 30,000 b/d and replenish Union's inventories of 1¼ million barrels of crude by December.**

Refined Oil Import Allowances for Crude Oil Guarantees

As mentioned earlier, oil refined overseas can be imported into the United States backed by emergency supplies of crude if there is sufficient excess domestic refinery capacity to refine the crude emergency oil supplies. The OSC accomplishes this objective for each District by limiting the amount of refined oil allowances backed by crude oil guarantees to its estimate of the amount of excess refinery capacity. Assume that District II now has excess refinery capacity for 20,000 b/d. The OSC would not approve allocations of import allowances for more than 20,000 b/d of refined oil imports into District II backed by crude oil guarantees. On the other hand, assume that District V has enough excess refinery capacity to refine crude emergency oil supplies in any plausible emergency. The OSC would not limit allowances of refined oil imports into District V backed by guarantees of crude.

In Districts that might have a shortage of refinery capacity in a plausible emergency, the OSC would levy a special tax we call a *refinery capacity charge* on all import allowances of refined oil backed by guarantees of crude. The tax would be designed to allocate import allowances for refined oil imports. If there were more requests for allowances for refined oil imports than the

*If imports were interrupted in January next year, Exxon could be ordered to supply immediately an average of 107,000 b/d in January from its inventories and Mobil could be ordered to start drilling more wells on its leases. If the interruption continued, Exxon could supply an average of 77,000 b/d and Mobil could produce 30,000 b/d more for a total average of 107,000 b/d for each month from February through November of next year. Exxon would be able to supply an average of 107,000 b/d from its inventories in December next year. Exxon and Mobil would supply a total of approximately 39 million barrels during the worst plausible emergency starting in January of next year.

**In an emergency starting in January of next year, Union's inventories would be drawn down at a rate of 30,000 b/d until the end of September of next year. By that time the OSC could order 160,000 b/d of crude from Elk Hills. 30,000 b/d would be used to replace imports and the remaining 130,000 could be used to rebuild Union's inventories. In the worst plausible case, at the end of next year Union would have its inventories of 1¼ million barrels of crude ready for its day-to-day operations and Elk Hills would be producing 160,000 b/d of crude.

limit set by the OSC, then the OSC would increase the charge. If there were fewer requests, then the OSC would decrease the charge. At equilibrium, the amount of refined oil imports requested by companies owning guarantees of crude would just equal the limit set by the OSC.

In the examples, assume that in District II at a refinery charge of \$.35 per barrel owners of guarantees of crude oil will request import allowances for 20,000 b/d of refined oil.

MARKETS FOR GUARANTEES AND IMPORT ALLOWANCES

Intermediaries

Since import allowances and guarantees can be bought, sold, and exchanged, intermediaries could specialize in assembling mixes of guarantees, acquiring fee-exempt import allowances for the guarantees, and selling the fee-exempt import allowances to importers. For example, an intermediary like First National Bank could buy Exxon's guarantee and Mobil's guarantee and use them to acquire a fee-exempt import allowance for an average of 107,000 b/d of crude imports into District I-II in January of next year. First National could then sell the fee-exempt import allowance to Occidental Petroleum. Occidental Petroleum could use the import allowance to exempt from the fee an average of 107,000 b/d of crude from Libya in January of next year. Here the importer has bought an import allowance directly instead of the guarantees needed to get an import allowance.

Under these conditions, markets could develop for guarantees and fee-exempt import allowances. The value of guarantees in the market is derived from the value of fee-exempt import allowances. The value of fee-exempt import allowances, in turn, depends upon the fee imposed on imports not covered by import allowances. The guarantee price can never push the cost of a fee-exempt import allowance above the cost of paying the fee on imports, since importers would choose to pay the fee instead of buying the import allowance. The price of an import allowance must also cover the administrative cost of issuing guarantees and applying for fee-exempt import allowances.

The Prices of Fee-Exempt Allowances

The per-barrel price of an import allowance could depend on the restrictions on the allowance. For example, assume that in District V there are not enough fee-exempt import allowances available to cover all the imports because most of the oil used in District V is imported, and most stored oil and unused production capacity are located in neighboring districts. The owners of fee-exempt import allowances for District V can sell them at any price short of the fee on imports since importers will choose the fee-exempt import allowance over the import fee, if it is cheaper. Therefore, the fee-exempt import allowances in District V will sell for close to \$.21 per barrel, the fee assumed previously for crude. Assume that there is sufficient excess refinery capacity in District V to refine emergency oil supplies of crude needed to replace imports of refined oil in an emergency. Therefore, the charge for acquiring refined-oil import allowances on the basis of crude oil guarantees will be zero, and there will be no difference between the cost of importing crude and the cost of importing refined oil into District V.

In contrast, assume that in District II there are more than enough crude emergency oil supplies to replace all imports. The owners of fee-exempt import allowances will compete against each other instead of the import fee in order to convince the importers to buy their import

allowances. This competition will drive down the price of fee-exempt import allowances of crude to, say, \$.05 per barrel.

We assumed earlier that the OSC would charge \$.35 per barrel for refined oil import allowances for District II backed by crude emergency oil supplies. This refinery capacity charge reflects the possibility of a shortage of refinery capacity in District II in an emergency. Since the owners of the guarantees will pass the refinery capacity charge on to the company buying the fee-exempt import allowance, the cost of importing refined oil into District II would be \$.40 per barrel.

If transportation of oil is inexpensive and fast, then there will be no large differences in the prices of fee-exempt import allowances from one District to another such as \$.21 per barrel of crude imported into District V and \$.05 per barrel of crude imported into District II. Emergency oil supplies in District II could be used to issue guarantees for District V because oil could be transported from District II to District V in an emergency. The tendency of guarantees to shift to the districts with the highest prices would tend to equalize the cost of importing oil in the districts.

The Prices of Guarantees

Guarantees could be priced by location, emergency length, future dates, and whether or not the oil supplied needed to be refined.

Location

Guarantees for locations with the highest priced, fee-exempt import allowances will tend to have the highest prices. For example, a guarantee of crude for District V will be more valuable than the same guarantee for District II since a fee-exempt import allowance for crude costs \$.21 per barrel in District V and \$.05 per barrel in District II.

Crude and Refined Oil

If 2 guarantees are identical, except one guarantee is for refined oil and the other is for crude, the price of the guarantee for crude will always be less than or equal to the price of the guarantee for refined oil. The only difference between the 2 guarantees is that the owner of the guarantee for crude might have to pay a fee if he chooses a refined oil import allowance, while the owner of the guarantee for refined oil does not have to pay the fee. Exxon's guarantee would tend to be more valuable than Mobil's guarantee for the same month since a refined oil import allowance in District II is worth \$.40 per barrel while an allowance for crude imports is worth only \$.05.

Emergency Lengths

If 2 guarantees are identical except for minimum emergency length, then the guarantee with the shorter emergency length will have the same or higher price. Importers will tend to pay more and secure oil suppliers charge more, the shorter the emergency length of the guarantee.

Guarantees with a shorter emergency length tend to be more valuable to importers because, the shorter the minimum emergency length, the more imports can be exempted from the fee by the guarantee in combination with other guarantees. In the examples, Atlantic-Richfield issues a guarantee for December next year with a minimum emergency length of 10 months. Some imports in both January and February next year would be exempted from the fee by a combination of

Atlantic-Richfield's guarantee for December, other guarantees for oil deliverable in January through November of next year, and a guarantee for January of the year after next.

To see the effect of a longer emergency length, suppose Atlantic-Richfield increases the emergency length of its guarantee to 11 months. Then Atlantic-Richfield's guarantee could be used in combination with guarantees covering January through November next year to exempt imports next January but *not* next February from the fee. If imports were interrupted in February and Atlantic-Richfield had the longer minimum emergency length than it would not have sufficient time to warn its overseas customers. Finally, suppose the emergency length is 12 months. Then the guarantee is useless as a means of exempting any imports from the fee. If imports were interrupted in or after January of next year Atlantic-Richfield will not have the 12 months needed to warn customers. If imports were interrupted before January of next year then the emergency supply period will be finished before Atlantic-Richfield can supply oil, since the emergency supply period is 1 year and Atlantic-Richfield can only supply oil in December next year.

Oil suppliers will charge more for guarantees with shorter emergency lengths because the shorter the emergency length, the greater the risk for the company issuing the guarantee. In the same example, Atlantic-Richfield reduces its risk if it increases the emergency length on its guarantee. If Atlantic-Richfield leaves the emergency length at 10 months, it risks being compelled to divert its exports back to the United States if imports are interrupted in January and February next year and the emergency lasts more than 10 months. If Atlantic-Richfield chooses instead, an emergency length of 11 months then it eliminates the risk of having to divert exports back to the United States in an emergency starting in February. If it chooses an emergency length of 12 months then it runs no risk at all, but, of course, no importer would pay anything for the guarantee issued.

Oil suppliers will also tend to charge more for guarantees with shorter emergency lengths because there is less competition, the shorter the guarantee emergency length. Companies like Exxon, Mobil, Union, etc., with minimum lead-times for their guarantees of less than 10 months can choose emergency lengths of 10 months and compete with Atlantic-Richfield. Atlantic-Richfield can not, however, choose an emergency length shorter than 10 months no matter how high the price of guarantees with short emergency lengths, because the OSC sets a 10 month minimum lead-time on Atlantic-Richfield's guarantees.

In sum, the shorter the emergency length, the more importers will have to pay and the more they will be willing to pay for the guarantee.

Future Dates

Increasing the time in the future that a guarantee can be used, increases the value of a guarantee. As mentioned before, imports in both January and February next year could be exempted by a combination of Atlantic-Richfield's guarantee and other guarantees. Atlantic-Richfield would be able to supply oil in an emergency in December next year, but an intermediary buying Atlantic-Richfield's guarantee would have to buy guarantees for January through November next year and January the year after next in order to get a fee-exempt import allowance. Adding future dates to Atlantic-Richfield's guarantee reduces the cost to an intermediary of obtaining

fee-exempt import allowances by reducing the amount of additional guarantees needed to obtain an allowance.*

Specifying more future dates on a guarantee increases the risk that the issuer of the guarantee will be forced to supply oil in an emergency. But adding future dates to the end of the period of time covered by a guarantee has an offsetting advantage of reducing the risk that the issuer of the guarantee will have to supply oil if insecure imports are only partially interrupted. This point will be discussed in more detail in the section, "The Oil Security System In An Emergency."

Guarantee Prices and the Emergency Supply Period

The OSC can observe how guarantee prices vary with emergency lengths to help determine what the effect of lengthening the emergency supply period would be. If there is a low price for guarantees with minimum emergency lengths close to the length of the designated emergency supply period, this indicates that lengthening the period would provide insurance that suppliers of secure oil consider unnecessary. In return for a low guarantee price, suppliers are willing to accept the risk of being ordered by the OSC to supply oil in a protracted emergency because they consider it unlikely that there will be an emergency lasting as long as the designated emergency supply period. Secure oil suppliers in this case are able to issue the guarantees because they can supply oil in ample amounts from newly-leased public lands and accelerated development of existing leases, given the amount of time in the emergency supply period.

AN ALTERNATIVE TO THE MARKETS FOR GUARANTEES AND ALLOWANCES

The government could replace the markets for guarantees and allowances by taxing all imports and subsidizing emergency oil supplies. The imports and emergency oil supplies would be declared on *security accounts* monitored by the OSC. The OSC would adjust the taxes and subsidies so that the imports entering the different districts tended to be backed by sufficient emergency oil supplies. The revenue from the taxes would pay for the subsidies.

Conceptually there is little difference between security accounts and markets for guarantees and allowances. In the one case the importer pays a tax which the government uses to pay a subsidy to an oil supplier with emergency oil supplies. In the other case an importer buys a fee-exempt import allowance or an oil supplier sells a guarantee. But reliance on security accounts reduces the number of steps needed to link imports with emergency oil supplies and increases the flexibility of the OSS. Security accounts will be the subject of another paper.

IMPORTS FROM SECURE SOURCES

The import fee represents the cost of the risk of an interruption in imports. The OSC exempts imports from the fee if the imports can be replaced in any plausible emergency. But some imports from some countries are as secure as domestically produced oil. Since there is no possibility that such imports would be interrupted in any plausible emergency, they should not be taxed or require

*If Atlantic-Richfield issues a guarantee with future dates of November and December then an intermediary buying Atlantic-Richfield's guarantee does not have to buy a guarantee for November in order to obtain an allowance for imports in January. If Atlantic-Richfield added a future date of January of the year after next, then an intermediary would not have to buy a guarantee for January of the year after next for a fee-exempt import allowance for February of next year.

guarantees. Thus, under the OSS there will be additional import allowances given or sold by the OSC for the amount of imports that would continue in any plausible emergency. For example, if the OSC estimates that a minimum of 4 million b/d of U.S. oil imports would continue in the worst plausible emergency, then the OSC would give or sell import allowances for a total of 4 million b/d of oil imports. The owner of an import allowance for imports from secure sources could use the allowance to exempt his imports from the import fee or could sell the allowance to other importers.

Secure Imports by Country

Wherever politically possible, the OSC would disaggregate the total amount of secure imports by country. Importers of oil from a given country would be given fee-exempt import allowances for the minimum plausible amount of U.S. oil imports from that country in an emergency. For example, Shell exports oil from Nigeria to the United States. In an emergency assume that the OSC estimates that Nigeria would continue to export at least as much oil as before the emergency. Therefore, Shell receives an import allowance for its exports from Nigeria to the United States.

Fee-exempt import allowances can be given importers from countries that might reduce, but not eliminate, exports to the United States in a plausible emergency. The less the maximum plausible reduction in imports, the cheaper it will be to import from the country. For example, Gulf exports oil from Canada to the United States. Assume that the OSC estimates that in an emergency Canadian exports to the United States could fall by as much as 25 percent, since the Eastern provinces of Canada are supplied by oil from the Middle East and these imports might be interrupted. Gulf received an import allowance for 75 percent of its Canadian exports to the United States. In effect, Gulf pays a fee on every fourth barrel exported to the United States from Canada or an average fee per barrel only one-fourth the import fee on oil from countries liable to interrupt exports of oil to the United States completely. If it chose to do so, Gulf could buy fee-exempt import allowances in the market rather than pay the fee.

Fee-exempt import allowances can be used to encourage imports from countries that are expected to increase exports in an emergency. For example, Creole Petroleum exports oil from Venezuela to the United States. Assume that the Venezuelan government signs an agreement with the United States to increase its oil exports to the United States. The OSC estimates that Venezuelan oil exports to the United States would increase by at least 10 percent in the worst plausible emergency. Creole Petroleum receives a fee-exempt import allowance for 10 percent more than it exports to the United States. Creole Petroleum can sell the extra fee-exempt import allowances to importers from countries that might embargo the United States.

Total Secure Imports

The OSC's estimate of the total amount of secure imports could be greater than the sum of fee-exempt import allowances it decides to give to importers of secure imports for 2 reasons. First, the OSC might be unwilling to discriminate overtly among certain countries because of the political repercussions of such discrimination. For example, if the United States gave fee-exempt import allowances for imports from Iran and no fee-exempt import allowances for imports from Saudi-Arabia, then Saudi-Arabia might view this as a U.S. tilt towards Iran in their dispute in the Persian Gulf and decide to limit its exports to the United States in retaliation. For this reason the OSC might not give fee-exempt import allowances to importers from the Middle East and North Africa, despite the fact that the United States expects to receive some oil from this region in any plausible emergency.

Second, the OSC might consider it very unlikely that every country would simultaneously export only the minimum plausible amount of oil to the United States. For example, there is a chance that Nigeria might be unable to increase its exports to the United States in an emergency. There is also a chance that Canada might have to reduce its exports to the United States in an emergency. There is, however, a smaller chance that both things will happen simultaneously.

Auction of Import Allowances

The OSC auctions import allowances equal to the difference between its estimate of total secure imports and the sum of import allowances for secure imports by country. Although an importer must pay the government for the import allowance, once the import allowance is acquired the importer can use it to exempt his imports from the fee. In the example if the OSC gave away import allowances for 3 million b/d to importers for secure imports then the OSC would auction import allowances for an additional 1 million b/d to the highest bidder so that a total of 4 million b/d would be covered by import allowances for secure imports.

OVERVIEW OF THE OPERATION OF THE OIL SECURITY SYSTEM

Under the OSS imports are not taxed if the risk of the imports being interrupted is not worth insuring against, or the imports, if interrupted, would be replaced with a minimum of government intervention and without negative consequences for the economy.

The imports that are taxed are vulnerable to interruption. If these imports are interrupted the price of oil will increase sharply unless the government rations or mobilizes oil supplies. The per-barrel fee reflects the cost of the risk to the U.S. economy of an interruption of these imports.

But imports that would otherwise be subject to the fee are exempted if the importer holds guarantees issued by oil suppliers to supply oil in an emergency.

THE OIL SECURITY SYSTEM IN AN EMERGENCY

THE FEE IN AN EMERGENCY

The OSC can reduce or eliminate the fee on imports in an emergency to encourage an increase in imports from countries still willing and able to export to the United States and to increase the economic pressure on other exporters to resume exporting oil to the United States.

Once the emergency has passed, imports should increase sharply as importers try to buy oil before the fee is reimposed. By gradually increasing the fee, the OSC can channel the rush of imports into rebuilding oil inventories used for fee-exempt import allowances.

THE COMPREHENSIVE EMERGENCY PLAN

Guarantees can be viewed as detailed emergency plans made before an emergency. In an emergency the OSC assures oil supplies for the U.S. economy by assembling the individual guarantees into a comprehensive plan. The plan states for each month:

- (1) the amount of additional oil that will be supplied by domestic oil suppliers;
- (2) the area in which the oil will be supplied;
- (3) the oil suppliers that should have started preparing to supply more oil in the future;
- (4) the tracts of land that will be leased for production;
- (5) the reduction in the consumption of oil from rationing; and
- (6) the reduction in oil consumption from conversion to alternative, secure fuel sources such as coal or natural gas.

The plan is based on the commitments made by oil suppliers issuing guarantees and the ability of the OSC to mobilize uncommitted oil supplies, ration, and persuade companies to convert to alternative sources of energy.

Amount of Additional Oil Supplied

The amount of additional oil supplied under the emergency plan depends on the severity of the interruption in imports. If all insecure imports were actually cut off, then the OSC could order the use of all emergency oil supplies backing the imports covered by fee-exempt import allowances. The OSC would mobilize uncommitted oil supplies for the imports that were taxed instead of backed with emergency supplies. The OSC could be able to cope with the interruption in U.S. oil imports in this way for the length of the emergency supply period. In the more likely case of a partial interruption of insecure imports, the OSC would need to use only a fraction of the emergency oil supplies held by issuers of guarantees for any given month. Therefore, the OSC would be able to rely on the emergency oil supplies to replace imports for longer than the emergency supply period.

Supply Dates

We call the dates on which the OSC expects the issuer of a guarantee to supply the additional

amount of oil required under the emergency plan the *oil supply dates* for the guarantee. For example, assume that the U.S. oil supply is reduced in February next year by one-fourth of the amount of imports previously considered insecure. If all insecure imports had been interrupted, Exxon would have been ordered to deplete its inventories of 30 million barrels of gasoline in February of next year. But since only 1 out of every 4 barrels of insecure oil imports have been interrupted, Exxon can draw down its inventories over the 4-month period from February through May. The supply dates for Exxon in this emergency would be February, March, April, and May. The minimum emergency length on Mobil's guarantee is 1 month. If all insecure imports had been interrupted, then the OSC would have ordered Mobil to supply oil in March. But companies issuing guarantees with an emergency length of zero will be able to replace imports through May because imports are only partially interrupted. Therefore, Mobil's supply dates start in June.

The oil supply dates can be changed during the emergency as the severity of the emergency changes. If all insecure imports were suddenly interrupted in March then Exxon could be ordered to supply all the gasoline remaining in its inventories and Mobil could be given a supply date of April. Similar adjustments could be made in the supply dates of all other companies issuing guarantees.

Rules for Selecting Supply Dates

The supply dates should be selected according to the following 2 rules:

First, the lapse of time between the start of the emergency and the earliest oil supply date for a guarantee should be greater than or equal to the minimum emergency length on the guarantee. Otherwise, the minimum emergency length would be largely meaningless, since the issuer of the guarantee could be ordered to supply oil in an emergency that is shorter than the minimum emergency length specified on the guarantee. Since Mobil issues a guarantee for February through November of next year with a minimum emergency length of 1 month, the earliest supply date for Mobil for an emergency starting in February would be March.

The only exception to this rule could take place if the issuer of the guarantee had issued a similar guarantee earlier with a shorter emergency length but, anticipating an emergency, increased the emergency length of the guarantee just before the OSC declared an emergency. Without this exception, there would be violent fluctuations in the emergency lengths in the guarantees. If a company knew when the emergency was going to start it would choose the shortest emergency length possible for its guarantee up to a few days before the emergency and then change to the longest emergency length possible. Changing emergency lengths just before the emergency, if permitted, would maximize revenue from the guarantee before the emergency and minimize the risk of being forced to supply oil during the emergency. In the examples, Mobil issues a guarantee with a 1-month emergency length. On learning in January of next year that an emergency would be declared the following month, Mobil would not try to increase the emergency length of its guarantee, if it knew that the OSC would use the 1-month emergency length anyway.

According to the second rule, the minimum emergency lengths should determine approximately the order in which the issuers of the guarantees have to supply oil. The guarantees with the shortest emergency lengths tend to be used first. In the examples, Exxon's guarantee of oil from its inventories should be used before Mobil's guarantee of accelerated production from existing leases and Mobil's guarantee should be used before Texaco's guarantee of production from spare capacity in existing wells because Exxon's, Mobil's, and Texaco's guarantees have emergency lengths of zero, one, and two months.

There are 2 major exceptions to this rule. The first exception occurs in a partial interruption of imports that the OSC expects to last longer than the emergency supply period. The OSC should then avoid choosing supply dates that decrease the total amount of emergency oil supplies. For example, if an emergency started in February Mobil could be ordered to produce an additional 30,000 b/d from March through November of next year, for a total of approximately 8 million barrels of crude. But the second rule requires Exxon, whose guarantee has a minimum emergency length of zero, to exhaust its inventories of 30 million barrels of gasoline before Mobil would be forced to start producing and Exxon's inventories would not be exhausted before the beginning of June. If the OSC waited until June before ordering Mobil to start producing 30,000 more b/d then Mobil would only produce from June to November for a total of only 5.4 million barrels of crude. If Exxon's inventories are used before Mobil's unused production capacity, then total emergency supplies would be lower by almost 3 million barrels. In this case, if there is a significant chance that the emergency might last longer than 1 year, the OSC can require Mobil to start producing in March and use Exxon's inventories later.

This same exception explains why adding future dates to a guarantee can reduce the risk that the issuer of the guarantee will have to supply oil if insecure imports are only partially interrupted. In a partial interruption of imports the OSC would tend to postpone using open-ended guarantees of oil and use guarantees first that were restricted to a few future dates. Conceivably Atlantic-Richfield could be forced to divert its exports back to the United States in December next year before Exxon would be forced to use up completely its inventories, although Exxon's guarantee has a shorter emergency length than Atlantic-Richfield's. The OSC can use Exxon's guarantee any time in the future, but Atlantic-Richfield's guarantee is restricted to December. If the OSC postpones using Atlantic-Richfield's guarantee then it cannot use it at all, and the total amount of emergency oil supplies available during the emergency decreases.

The other major exception takes place if a partial interruption of imports affects disproportionately the supply of oil refined overseas or the supply of oil in 1 district. The OSC should choose supply dates that replace imports efficiently. If only refined oil imports are interrupted, there would be little point in forcing companies such as Texaco and Mobil to supply crude if there were not enough domestic refinery capacity to refine the additional crude. The brunt of the interruption in imports would have to be taken by refined emergency oil supplies such as Exxon's inventories of gasoline. If imports were interrupted in District V but not in District I, it would be inefficient to force companies in District I to supply oil to District V if adequate emergency oil supplies were available in District V.

Exchanges of Emergency Lengths

Fortunately, most of the inefficiencies in the emergency plan will be eliminated by the individual companies if the OSC allows them to exchange emergency lengths on guarantees after an emergency starts.

In the examples, Texaco issues a guarantee with a minimum emergency length of 2 months and a minimum lead-time of zero, while Mobil issues a guarantee with a minimum emergency length of 1 month and a minimum lead-time of 1 month. Assume that in the partial interruption of imports starting in February, Texaco is supposed to produce 5,000 more b/d in October by producing at capacity from existing wells, while Mobil is supposed to produce 30,000 more b/d in June through November by drilling new wells on existing leases. It would be wasteful for Mobil to have to drill new wells before Texaco produced at capacity from existing wells. Mobil could pay

Texaco enough so that Texaco would agree to exchange emergency lengths for 5,000 b/d. Texaco takes an emergency length of 1 month for its guarantees so that Mobil can take an emergency length of 2 months for 5,000 b/d on its guarantees. In the partial interruption of imports starting in February, Texaco supplies 5,000 more b/d from June through October and Mobil does not have to start producing the full 30,000 more b/d until October. Mobil must still supply 25,000 more b/d in June through September or find another company with a supply date after June willing to exchange emergency lengths.

An exchange of emergency lengths would continue to affect supply dates if the severity of the emergency changed. If the emergency that started in February worsens so that all insecure imports have been interrupted in March, the OSC would order Texaco to start producing 5,000 b/d in April and Mobil to start producing the full 30,000 more b/d in May.

Adding future dates to a guarantee increases the value of the guarantee in exchanges of minimum emergency lengths. If Texaco had added November as a future date to its guarantee before the emergency started then Mobil would have been willing to pay more for the exchange of emergency lengths because Mobil could have deferred the additional production of 5,000 b/d for another month.

Preparation Start Dates

The OSC can use the minimum lead-time on each guarantee to be certain that the issuers of the guarantees start preparing to supply the oil early enough so that the oil will be available on the oil supply date.

Specifically, for each guarantee the OSC assigns a date by which the OSC expects the issuer of the guarantee to have started preparation in order to be able to provide the oil guaranteed by the supply date. The difference between the earliest oil supply date and the preparation start date should be equal to the minimum lead-time of the guarantee, so that if the company waits past the preparation date it will not have enough time, according to the OSC estimates made before the emergency, to produce the oil and transport it. The issuer of the guarantee knows that the OSC will check on the preparation date to be certain that the issuer of the guarantee is taking the steps necessary to supply the oil needed in the emergency.

Guarantee Rights in an Emergency

The guarantee rights for unleased land provide the OSC with detailed plans for developing unused public lands. Each plan estimates the amount of oil that could be produced, the time needed to produce the oil, and the areas that could be supplied with the oil. The emergency lease times rank these plans according to the environmental costs of implementing each plan. Production from unleased land that would cause great environmental damage tends to be limited to the possibility of a protracted and severe oil shortage. Production from unleased land that would cause little environmental damage can take place in the beginning of the emergency. Estimates of environmental damage are based on environmental impact studies with public hearings held for especially controversial leases. Both the impact studies and the hearings take place before the emergency starts, so there is sufficient time to examine thoroughly the ramifications of leasing a particular tract of land for production.

All emergency leasing of land is subject to strict controls in order to prevent abuse. If insecure imports are completely interrupted, the OSC must wait until the emergency lease time has elapsed on the guarantee right to a particular tract of land before leasing the tract. In the example, Sun Oil owns the guarantee right to a tract of land in the Gulf of Mexico with an emergency lease time of 4 months. If an emergency started in February, Sun Oil could not receive permission to start drilling on the land until June.

If there is a partial interruption of imports, before leasing a tract of land the OSC must first use the oil from all guarantees with minimum emergency lengths less than or equal to the emergency lease time on the guarantee right. In the examples, Exxon, Mobil, Union, and Texaco issue guarantees with emergency lengths that are 4 months or less. Exxon and Union must deplete their inventories and Mobil and Texaco start producing oil before the OSC can convert Sun Oil's guarantee right into a lease.

The OSC is responsible for oil security. Whenever possible leasing a tract of public land in an emergency will be left to the Department of Interior. But if the Department of Interior fails to lease a tract of land needed in an emergency, then the OSC would be empowered to lease the land to the company owning the guarantee right. In the case of Sun, the Department of Interior would normally buy back the guarantee right and lease the land to the highest bidder, say Gulf Oil, once it became apparent in an emergency that the land was going to be leased. But if the Department of Interior did not act in time, then the OSC could order Sun to start producing from the land.

The Department of Interior also reserves the right to order the wells capped or development of a lease stopped once the emergency is over. The company owning the lease would be allowed to issue guarantees and would be compensated for the expense of drilling the wells. If this option is exercised, it would reduce the environmental cost of using public lands in an emergency. Repeated interruptions of oil imports would create a large amount of capped wells on public lands capable of being uncapped and used if imports were interrupted. In the previous example, assume that the partial interruption of imports is over in September of the year after next and the flow of oil exports to the United States has returned to normal. The Department of Interior could pay Gulf for the cost of developing the lease and order Gulf to cap its wells and stop production. Gulf would retain the guarantee right for the land in this case.

Consumption Reduction

The OSC must compare the cost of ordering companies to honor their commitments to supply more oil from inventories, spare production capacity, and unleased public lands with the cost of reducing the consumption of oil by rationing and ordering companies to convert to alternative secure sources of energy.

If feasible, the OSC could allow the consumer groups and companies that risk rationing and forced conversion to alternative fuels, to issue guarantees for the oil they could save by reducing their consumption of oil in an emergency. This type of guarantee might be called a *consumption reduction guarantee*. However, as already noted, in this paper we limit the concept of guarantees to cover only emergency oil supplies.

EXAMPLE OF THE OSS IN AN EMERGENCY

The different examples of the OSS in an emergency cited previously are described in more detail to illustrate how the OSC would assure an adequate supply of oil if imports were interrupted.

Partial Interruption of Insecure Imports

Assume that one-third of insecure imports are suddenly interrupted in February of next year due to an embargo of the United States, and all countries supplying oil to the United States, by some of the oil producing countries in the Middle East and North Africa. The OSC would take the following steps in February:

- (1) The fee on imports of crude and gasoline is eliminated. Importers who previously paid as much as \$.21 per barrel of crude or as much as \$.63 per barrel of gasoline find that they can import without paying these fees. As a consequence importers increase the price they are willing to pay for oil from foreign countries. As the price increases, such countries as Canada and Venezuela increase their exports to the United States, replacing some of the imports from the Middle East and North Africa. But the U.S. oil supply is still reduced by, say, one-fourth of the imports previously considered insecure.
- (2) The OSC assigns supply dates to the companies issuing guarantees. Exxon is ordered to supply gasoline and Union is ordered to supply crude from their inventories in February through May. They could exhaust their entire inventories in the first month of the emergency, but since only 1 out of every 4 barrels of insecure oil imports have been interrupted, they are ordered to draw down their inventories more slowly.
- (3) Mobil is to start producing 30,000 more b/d in June through November. If the imports were completely interrupted, the OSC could order Mobil to start supplying oil in March, since the guarantee issued by Mobil has an emergency length of 1 month. But Mobil's supply date is in June because imports are only partially interrupted.

According to the OSC, Mobil needs at least 1 month to drill the new wells on its leases needed to increase production by 30,000 more b/d. Therefore, Mobil's preparation date is in May and the OSC will check at the beginning of May to insure that Mobil is preparing for increased production in June.

- (4) Texaco is to start producing 5,000 more b/d in October by operating its wells at capacity. But Texaco is paid by Mobil to exchange supply dates. Texaco agrees to produce 5,000 more b/d in June so that Mobil would not have to start producing the full 30,000 more b/d before October. Texaco's guarantee does not have any minimum lead-time because the OSC estimated that Texaco would need only a few days to increase production of its wells to capacity and transport the additional oil produced.
- (5) Atlantic-Richfield is to supply 10,000 more b/d in December by diverting exports back to the United States. Although this is only a partial interruption, the OSC cannot postpone assigning a start date to Atlantic-Richfield's guarantee because Atlantic-Richfield is obligated to supply oil only in December next year.

- (6) The OSC also develops a plan for rationing the motorists' demand for gasoline and encouraging utilities to convert from oil to coal. Companies capable of supplying more oil but not issuing guarantees are ordered by the OSC to increase oil production. The OSC needs to take these three steps to replace imports that were taxed instead of backed by guarantees, to the extent there were such imports.

Intensification of the Emergency

Now assume that Saudi-Arabia joins the embargo. War breaks out between Iran and Iraq temporarily interrupting oil supplies from Iran. The OSC expects that by April every barrel of oil imports previously considered insecure will be interrupted. The OSC updates its emergency plan to assure oil supplies despite the intensification of the emergency in April.

- (1) Exxon and Union are ordered to exhaust by the end of April their inventories used to guarantee gasoline and oil. Texaco is ordered to start producing in April. Mobil is ordered to start drilling in March so it can produce 25,000 b/d more in April and 30,000 b/d more in May. Preparations for production from Elk Hills will start in August because it takes 3 months to uncap wells and transport oil.
- (2) The Department of Interior buys back the guarantee right from Sun for a tract of land in the Gulf of Mexico. In June the land will be leased to Gulf for production by December, since Gulf is the highest bidder.

End of the Emergency

But in July the embargo of the United States collapses. The war between Iraq and Iran is settled. Saudi-Arabia resumes exports of oil to the United States.

The OSC announces that it plans to raise the fee on imports of crude to \$.21 per barrel and the fee on imports of gasoline to \$.63 per barrel by October. Importers rush to buy oil before the fees are reimposed. The influx of oil is used to replenish inventories. Gulf is told to suspend preparations for drilling in the Gulf of Mexico and compensated for the amount of money bid on the lease and the amount spent preparing to drill.

ADMINISTERING THE OIL SECURITY SYSTEM

The OSS can be administered with a minimum of government intervention without sacrificing accuracy in the estimates of the emergency oil supplies, emergency transportation capability, and emergency refinery capacity. Decisions about the import fee, emergency supply period, and the emergency leasing policy for public lands should reflect informed public opinion. The administrative cost of the OSS will be paid entirely by those who benefit from the OSS.

ACCURATE ESTIMATES OF EMERGENCY OIL SUPPLIES

The accuracy of the estimates of the emergency oil supplies is crucial to the success of the OSS. If companies consistently overestimate emergency oil supplies, then the security provided by the guarantees could be largely illusory. In an actual emergency, some of the emergency oil supplies guaranteed might not be available.

The OSC fines companies for overestimates and subsidizes them for underestimates in order to solve this problem. The fines for overestimates and the subsidies for underestimates are set at the levels that the OSC feels will cause underestimates to cancel overestimates.

Overestimates

Overestimates of emergency oil supplies cause additional fee-exempt imports to enter the United States. Part of the savings from these additional fee-exempt imports can be captured by the companies overestimating emergency oil supplies. If the companies do not expect all of these savings to be taxed away by the OSC, then the companies have an incentive to overestimate emergency oil supplies.

For example, assume that Exxon expects that it can reduce its inventories by at most 20 million barrels of gasoline without seriously affecting day-to-day operations. A more sizable reduction in inventories would create significant spot shortages. But assume that Exxon, by issuing a guarantee for 30 million instead of 20 million barrels of gasoline, will increase the amount of fee-exempt gasoline imports next year by 10 million barrels. Since the fee on imports of gasoline is assumed to be \$.63 per barrel, the increase in Exxon's revenues caused by the overestimate can be as much as \$6.3 million. This amount is the most importers will save next year by using the part of Exxon's guarantee that is based on an overestimate of emergency oil supplies instead of paying the import fee. If Exxon does not expect the OSC to tax away all this revenue once it learns that Exxon overestimated its inventories, then Exxon has a strong incentive to overestimate emergency oil supplies.

But even if the OSC were certain to tax away the increase in revenue caused by an overestimate, companies could still overestimate to increase revenue temporarily. The OSC would have to tax the company for the use of the revenue gained from the overestimate. In the previous example, assume that Exxon makes \$6 million more by selling a guarantee for 30 million barrels instead of 20 million barrels of gasoline. Although Exxon eventually might have to pay \$6 million in fines, Exxon has the use of the money from the time it sells the guarantee to the time that the OSC fines Exxon for overestimating emergency oil supplies. Assume that Exxon earns \$.5 million by investing the \$6 million. If Exxon does not expect the OSC to tax away both the revenue and

the income from the revenue, then Exxon will still have an incentive to overestimate emergency oil supplies.

The amount of time it takes to verify the emergency oil supplies depends on the guarantee. The OSC will be able to verify the accuracy of Texaco's guarantee in November and December next year when Texaco produces at capacity. Mobil plans to complete drilling its new wells by the end of November next year. Sun Oil might not have its guarantee from unleased public land in the Gulf of Mexico verified until 10 or 15 years in the future when the land is leased.* But in each situation, the longer the time before the OSC can verify the claims made by the company, the greater the interest that accumulates on the fines for overestimates.

As mentioned in the section on guarantees, if it appears that it might be impossible to test definitively a company's claim in the future or the company has seriously and repeatedly overestimated emergency oil supplies in the past, the OSC sets a ceiling on the amount of oil that can be guaranteed. But the ceiling does not absolve the company issuing the guarantee of its responsibility to pay fines on overestimates if the OSC eventually does succeed in testing the guarantee. As shown in the examples, the OSC sets a ceiling of 5,000 b/d on Sun Oil's guarantee right because the tract of unleased land used by Sun to issue guarantees might never be leased and geological and geophysical data indicate that 5,000 b/d is a conservative estimate of the amount of oil that Sun should be able to produce. Sun's management is more conservative than the OSC and issues a guarantee for only 4,000 b/d. But when the land is leased 5 years later, it becomes apparent that Sun could not have produced more than 3,000 b/d from the land. Sun must pay a fine for overestimating emergency oil supplies despite the ceiling selected by the OSC.

In sum, the fine for overestimates would depend on the type of guarantee affected by the overestimate and the length of time from the date the guarantee caused an increase in fee-exempt imports to the date that the OSC discovered the overestimate.

Underestimates

Companies must specify in their guarantee contracts how, instead of how much, they plan to produce in an emergency, if they want to receive subsidies for underestimates of emergency oil supplies. In the examples, assume that Mobil contracts to accelerate development of its leases, specifying in its contract the location and type of wells it would drill in an emergency. Assume that Mobil will prove in December next year that it could have produced 40,000 more b/d from February to November by drilling these wells in February. Mobil could claim an underestimate of 10,000 b/d for February through November, since the OSC could have ordered Mobil to produce more oil than the 30,000 b/d specified on Mobil's guarantee.

But, if the issuer of the guarantee contracts to supply only the amount of oil guaranteed, then it cannot claim an underestimate of emergency oil supplies. In the examples, Texaco issues a guarantee for 5,000 more b/d. Assume that Texaco contracts to supply only the amount of oil guaranteed. Assume also that Texaco proves in November and December next year that it could

*A company issuing guarantees based on its inventories must have enough inventories for the entire emergency supply period unless the guarantee specifies a replacement date. Since Exxon's guarantee is going to be used to back imports from January through December next year, and the emergency supply period is 1 year, Exxon must have inventories through December of the year after next. If imports were interrupted in December of next year and Exxon did not have enough inventories in November of the year after next, then the interruption of imports could cause serious spot shortages.

have produced 6,000 more b/d by operating its wells at capacity in January through October next year. In an emergency the OSC cannot order Texaco to produce more than 5,000 more b/d. Therefore, Texaco cannot claim the additional 1,000 b/d as an underestimate of the amount of oil it would supply in an emergency.

Fines and Subsidies

The fines on overestimates are used to finance subsidies of underestimates. Therefore, a fine on an overestimate increases the accuracy of the estimate of total emergency oil supplies for a given type of guarantee by discouraging companies issuing the guarantee from overestimating emergency oil supplies on purpose and encouraging companies issuing the guarantee to underestimate emergency oil supplies.

The OSC can check its fines and subsidies by observing past emergency scenarios. The information on past guarantees predicts the amount of oil that would have been available in a hypothetical emergency in the past. As the OSC obtains information about overestimates and underestimates, it can update these past emergency scenarios. If the fines and subsidies are correct, then for each type of guarantee the underestimate will tend to cancel the overestimate.

For example, assume that the OSS had been adopted several years ago. In order to check the accuracy of its fines on overestimates and subsidies for underestimates, the OSC examines what would have happened if imports had been suddenly interrupted in January last year. The OSC finds that some of the companies supplying gasoline from inventories in Districts I-II would not have been able to supply the amount guaranteed. On the other hand, the OSC finds that other companies would have been able to supply more gasoline than the amount guaranteed and the additional amount of gasoline these companies could supply would have enabled the OSC to replace the supplies of gasoline promised by companies that would have been unable to deliver them. The fine for overestimates and the subsidy for underestimates affecting guarantees of gasoline for Districts I-II with minimum emergency lengths of zero would not be changed if past emergency scenarios indicate that underestimates cancel overestimates for this type of guarantee.

If the sum of the overestimates of a type of guarantee is consistently much larger than the sum of the underestimates, then the fine for the overestimates is too small. In the future, the OSC should increase the fine and also increase the subsidy for all underestimates that can be used to offset the overestimates of that type of guarantee.

For example, assume that the OSC finds that if imports had been suddenly interrupted in January last year, companies guaranteeing emergency oil supplies of crude for District III after the emergency lasts 1 month would be unable to supply all the oil guaranteed. The OSC finds that the companies underestimating emergency oil supplies would not have been able to cover the shortfall caused by companies overestimating. Assume that this has happened repeatedly in past emergency scenarios. The OSC then increases the future fine for overestimates affecting the emergency oil supplies in District III with a minimum emergency length of 1 month, and increases the future subsidies for underestimates for all guarantees for crude or refined oil with a minimum emergency length of 1 month or less and an area that includes District III.

Underestimates on guarantees of a given emergency length and for a given area may be used to offset overestimates on guarantees with equal or longer emergency lengths and the same or a smaller area. Since a fine on an overestimate contributes to subsidies for all underestimates that can

be used to offset the overestimate, the subsidies for underestimates will be larger, the shorter the minimum emergency length or the larger the area specified on the guarantee. The subsidy for an underestimate of oil that does not need to be refined will also be larger than the subsidy for an underestimate of crude. In this way, the subsidies tend to provide the greatest incentive to underestimate emergency oil supplies than can be easily shifted to the area in or dates during the emergency affected by overestimates.

In the examples, Mobil underestimates a guarantee with a 1 month emergency length. Fines for overestimates on guarantees for crude in District I-III with a 1 month or longer emergency length will contribute to the subsidy Mobil receives because the OSC can order Mobil to help offset any of these overestimates. If Mobil reduces the area covered by its guarantee from Districts I-III to just District III, then the OSC could not order Mobil to supply oil to offset overestimates in Districts I or II. Mobil's subsidy would be less because it can now share only in the revenue from fines on overestimates in District III. If Mobil could change its guarantee from crude to refined oil, then the OSC could order Mobil to supply oil in an emergency to offset reductions in imports of either crude or gasoline. Mobil would receive revenue from fines on overestimates of guarantees for crude and guarantees for refined oil. Finally, if Mobil increases the minimum emergency length from 1 to 5 months, the OSC could not order Mobil to supply oil in emergencies lasting less than 5 months. Mobil would lose revenue from the fines on overestimates for guarantees with emergency lengths from 1 to 4 months.

But whatever the structure of subsidies and fines selected, the OSC does not have to estimate the amount of oil that each company can produce in an emergency in order to have an accurate estimate of the total amount for each area and emergency length. The OSC can concentrate on the results from the fines and subsidies as described by past emergency scenarios. If these scenarios indicate that errors in past estimates tended to cancel and there is no reason to assume that this will not be true in the future, then the government's role in estimating emergency oil supplies is reduced to calculating past overestimates and past underestimates. The individual companies are responsible for estimating their own future emergency oil supplies.

In the examples, Exxon, Texaco, and Mobil estimate how much future inventories, increased production from existing wells, and drilling of new wells on existing leases can supply in an emergency. These companies have better information than the government to make accurate estimates. These companies have an incentive to avoid overestimates because they know the OSC will examine future inventories, production records of existing wells, and production records for new wells once drilled, and will tax away the revenue from overestimates.

The need for the government to predict future emergency oil supplies for individual companies is limited to contracts between oil suppliers and the OSC that set ceilings on the amounts of oil guaranteed. But even if the OSC sets a ceiling too high, the company may choose to guarantee less oil because of the possibility that the OSC will eventually discover the overestimate and levy a fine. In the examples, Sun did not choose to guarantee the 5,000 b/d that the OSC estimated it could produce in an emergency from the Gulf of Mexico because Sun correctly anticipated that it could not produce that amount of oil in an emergency and that eventually it would be fined for overestimating emergency oil supplies if it claimed the full 5,000 b/d.

EMERGENCY SCENARIOS AS A CHECK ON THE ACCURACY OF OTHER ESTIMATES

Emergency scenarios would be used to review and improve OSC decisions. Although companies are responsible for their estimates of emergency oil supplies, the OSC must still determine how long it takes to transport oil, whether or not emergency oil supplies can be refined, the emergency supply period, and the import fee.

The detail provided by the guarantees and the ease of converting guarantees into an emergency plan would enable the OSC to publish periodically detailed emergency scenarios. If the OSC overestimated the ability of the oil industry to transport oil or refine oil in an emergency in these scenarios, and this led to greater fee-exempt imports, then industry groups that oppose expansion of imports will use the information in the scenarios to find and publicize the mistakes made by the OSC. If the OSC underestimates transportation capabilities or refinery capacity then the companies refused fee-exempt import allowances and consumer groups concerned about the cost of oil will use the information in the scenarios to find the mistakes and publicize them.

The detailed emergency scenarios would describe when public land would have been leased in the past. If the risk of damage to the environment is considered too great, public opinion could force the OSC to increase the minimum emergency lease times on guarantee rights.

The OSC could use the difference between its estimate of the amount of oil available in an emergency scenario and the amount of oil actually consumed, to predict the rationing, the increase in the price of oil and oil products, the increase in unemployment, the fall in GNP, etc., in the scenario. The OSC could compare its estimate of the cost of raising the fee or increasing the emergency supply period, with the benefits from the reduction in the oil shortages in the emergency scenarios that would have been caused by a higher fee or a longer emergency supply period. Outside analysis would probably catch mistakes in the OSC estimates of shortages in future emergency scenarios and the cost of reducing these shortages.

The emergency scenarios could increase the influence of informed public opinion on government decisions. Those who felt that the cost of the risk of the shortages considered possible by the OSC was much greater than the cost of reducing the shortages, could use the information in the scenarios to press the government to increase import fees and the emergency supply period. Those who felt that the opposite was true would use the same information to argue for lower import fees and a shorter emergency supply period.

Finally, the emergency scenarios check the overall efficiency of the plans produced by the minimum emergency lengths chosen by the issuers of guarantees. As mentioned in the section, The Oil Security System in an Emergency, the OSC cannot force a company to supply oil in an emergency that lasts less time than the minimum emergency length specified on its guarantee. The OSC should order the companies issuing guarantees with the shortest emergency lengths to supply oil first in an emergency. Conceivably the companies issuing guarantees might choose minimum emergency lengths that would force the OSC to adopt an inefficient plan in an emergency. Despite the exceptions to the rules mentioned earlier and opportunities to exchange supply dates, companies might be forced to produce at a rate so large that it reduces total recovery in the long-run, or be compelled to uncap wells at a considerable cost before other companies had to draw down their inventories of oil. Past emergency scenarios would tend to show whether or not the plans that the OSC would have selected in the past, given the constraints imposed by the minimum emergency

lengths, were inefficient. If the OSC would have been forced to adopt wasteful plans in past emergencies then the rules could be modified. The OSC could be given more discretion in determining when emergency oil supplies would be used.

QUESTIONS ABOUT THE OIL SECURITY SYSTEM

TOO COMPLICATED FOR GOVERNMENT TO ADMINISTER

Q. Don't your proposals reflect an exaggerated belief in government efficiency? After all, under the OSS the government would have to select a fee on imports without allowances, fines for overestimates, subsidies for underestimates, and an emergency supply period. The government would have to estimate such things as the amount of oil an individual company could supply in an emergency from its inventories, from unused production capacity, and from drilling on unleased land.

A. The OSS places less of a burden on the government than the fee-only import policy and Senate bill S.1586 because, under the OSS, more government decisions are tested, and the government has more time and more information to develop an emergency plan than under the other two policies.

The crucial test under the OSS is the choice by importers between paying a fee on imports and buying a fee-exempt import allowance. Under the fee-only policy, the government, in effect, claims to know in advance that each importer should pay the fee it sets. Under S.1586, the government claims to know better than private industry where much of the oil should be stored and how much oil should be produced from Federal leases. Under the OSS, the government claims only that private, profit-maximizing businesses will choose the cheapest form of oil security. If it is cheaper to tax imports, then the importer will pay the fee instead of buying a fee-exempt import allowance. If it is cheaper to buy a fee-exempt import allowance from companies who store oil, produce at less than full capacity, plan to drill new wells and uncap old wells in an emergency, etc., then the importer will buy the fee-exempt import allowance.

There is even a test of the desirability of setting up and retaining an OSS. Since all administrative costs are to be paid by those who benefit from the OSS, companies would not apply for guarantees if they did not think that the benefits outweighed the costs. If no one applies for guarantees, there will be no OSS.

The OSS tests the need for government intervention on the grounds of oil security. If there would be sufficient emergency oil supplies under free trade to replace imports in an emergency, then oil suppliers will certainly have adequate emergency oil supplies under the OSS where importers are forced to buy guarantees in order to obtain fee-exempt import allowances. Instead of having to pay a company to increase its emergency oil supplies, importers would have to pay only enough so that secure oil suppliers issue guarantees on existing oil supplies. Therefore, the prices of guarantees and fee-exempt import allowances would tend to be very low and there would be little difference between the price of oil under free trade and the price of oil under the OSS.

Under the fee-only import policy, S.1586, and the OSS, the government sets fees on crude and gasoline imports based on considerations of oil security. But under the first two policies it is difficult for the government to determine when further increases in the import fees are not justified by oil security, because there is no test of the government's decision about the fee. Importers must pay the fee or not import at all. Domestic oil producers and refiners can use the argument of oil security to demand higher fees and there is no way to test this argument. Conversely, importers and consumer groups can argue that import fees could be eliminated without affecting security

significantly and there is no way to test this argument except by eliminating the fee and observing what happens.

Under the OSS, the importers' decisions between the fee and fee-exempt import allowance continuously test the government's choice of import fees. If the fee-exempt import allowance is cheaper than the fee, then payment of the fee is not justified on oil security grounds because there are sufficient emergency oil supplies to replace the import in any plausible emergency. If the fee is too high for all imports, then there will be no fee-paid imports because importers will buy fee-exempt import allowances instead. Alternatively, if the fee is high and nevertheless most imports are fee-paid (because guarantees are high priced too) then this would indicate that import fees could not be substantially reduced or eliminated without affecting oil security.

The government has to specify a minimum number of days that insecure imports can be replaced (emergency supply period) in both the OSS and S.1586. But under the OSS the government tests its decision in the market. The per-barrel prices of the guarantees with lead-times close to the length of the emergency supply period reveal the perception by private businesses holding oil inventories or maintaining spare capacity of the risk and cost of being forced to supply oil in an emergency. If these guarantee prices are negligible then companies are willing to issue these guarantees at low prices because they feel that the government will never have to use these guarantees in an emergency. Companies are able to issue these guarantees because of the relatively large amount of oil that could be produced in an emergency, given sufficient lead-time. There is no such test in S.1586.

The publication of past emergency scenarios that describe to the public the risks of dependence on oil imports and the cost of decreasing dependence, provides an additional test. Outside experts can use the information on the guarantees to check the emergency scenarios. Public opinion will press for changes in oil policy whenever the government appears to be too restrictive or not restrictive enough on foreign oil imports. This type of information is not readily available under a fee-only import policy and S.1586 because there is no incentive for secure oil suppliers to estimate and publish the amount of oil they can supply in different emergency scenarios.

If the government intervenes in the market to assure oil security, then it needs to know how much and how rapidly oil can be supplied if imports are interrupted. Under the fee-only import policy and S.1586 the government has to make rough estimates of these amounts and wait until an emergency actually starts in order to make more precise estimates. But this approach gives the government little time and information to develop a plan for solving the problems caused by a sudden oil shortage. It also creates an incentive among oil producers to dissimulate. Oil producers might underestimate oil supplies from capped wells if they felt that reopening the wells would be uneconomic. Oil producers would also tend to overestimate the amount they could produce from unleased land if they felt this increased the likelihood of the land being leased.

Under the OSS, companies prepare detailed estimates of the amount of oil they can produce from inventories, unused production capacity, and unleased land so that they can issue guarantees. The government eventually tests these estimates by examining company records of inventories and production. The government fines companies for overestimates and subsidizes them for underestimates. The government tests its fines and subsidies by examining past emergency scenarios. Past underestimates consistently cancelling past overestimates is evidence that the sum of the estimates prepared by the companies accurately predicts total future emergency oil supplies.

In short, once imports are interrupted under the OSS the government can turn to many detailed plans for supplying oil that are not available under the fee-only import policy or S.1586. The government then has reason to believe, based on past tests of estimates, it knows the amount of emergency oil supplies that will be forthcoming if these plans are adopted. Under the fee-only import policy and S.1586, the government has no such assurance and, in fact, has reason to suspect that oil suppliers may intentionally underestimate or overestimate emergency oil supplies.

VULNERABLE TO CHEATING BY COMPANIES

Q. The government depends on company records to find out whether or not the company overestimated emergency oil supplies in the past. Doesn't a proposal like this invite massive cheating by companies on their reports on inventories and production?

A. The OSS does depend on accurate reports by companies of inventories and production. Companies could conceivably falsify reports by overstating the amount of inventories and exaggerating the level of production obtained during tests. Government inspectors might be offered bribes to overlook inventory shortages and endorse false production levels.

But massive fraud under the OSS would be unlikely. A company would have to cheat repeatedly to make a large amount of revenue but would lose it all if the government discovered one case of falsified records. A conviction for fraud would of course result in criminal penalties. In addition, once the government has determined that a company has purposely falsified its records, the company would have to submit to an intensive audit for all uninspected past records. It would be fined for all overestimates of emergency oil supplies discovered in the audit. It would have to pay for the audit. The government might inspect the company's records more frequently in the future and, since the OSC charges for its inspections, this would constitute an additional penalty. The company could even lose its privilege to issue guarantees.

Although the OSC would need access to company records, there is little that is new in the kind of information required under the OSS from companies concerning their production and inventories. Production rates achieved during test periods would be recorded in company logs. Records of crude oil output have been required by the Texas Railroad Commission and other regulatory agencies for the much different purpose of enforcing ceilings on production. In fact, under government prorationing, government agencies require more detailed estimates and information about individual wells, e.g., the maximum efficient rate of recovery by well, than the OSC would require to monitor output under the OSS. Inventory information has also been collected for years. The Bureau of Mines collects it on an aggregate basis. Under the OSS the capability for verifying both the inventories and the production capability of individual companies could be improved. The costs would be borne by issuers of guarantees who, in turn, would recover them in guarantee prices.

INCENTIVE OF AVOIDING FEES IS INADEQUATE

Q. Currently the fee on imports of crude is \$.105 per barrel and imports of gasoline is \$.21 per barrel. According to the Cabinet Task Force on Oil Import Control "oil storage would cost \$.29 per barrel per year in salt dome cavities, and \$.58 in steel tanks . . . Our own highly tentative

estimates suggest a resource cost (of spare capacity) of around \$1.00 per barrel per year.”* Isn’t the incentive of avoiding the fees too weak to influence decisions by oil producers and oil consumers?

A. Current fees will almost certainly increase. The April 18th Energy Message announced that the fee on crude imports would eventually double to \$.21 per barrel and the fee on gasoline imports would eventually triple to \$.63 per barrel. Concern for national security and pressure for higher fees from domestic oil producers and refiners could force the fees even higher. Import allowances were worth from \$1.00 to \$1.60 per barrel from almost the inception of the Mandatory Oil Import Control Program in 1959 to 1971.

The cost of storage sets a ceiling on the fee that importers will pay under the OSS rather than purchase fee-exempt import allowances. Suppose that 90 barrels of oil storage are needed for each allowance to import 1 barrel per day without fee. Assume that the minimum average cost of replicating storage indefinitely in steel tanks is \$1.00 per barrel per year. It would cost \$90 per year to store 90 barrels of oil in steel tanks in order to acquire a fee-exempt import allowance to import 1 barrel per day. If the fee were greater than \$.25 per barrel, it would be cheaper to store oil (\$90 per year) than pay the fee (more than \$91.25 per year). All importers would eventually buy fee-exempt import allowances instead of paying the fee.**

But estimates of the average instead of the marginal cost of oil storage or spare capacity understate the effect of the Oil Security System on oil inventories and domestic production. If producers maximize profits then under current policy they will store an amount of oil such that the benefit of additional storage is only slightly less than the cost of constructing additional facilities and storing more oil. Producers will operate their wells at a level of production such that the savings in lifting costs, transportation costs, future productivity from the wells, etc., are only slightly less than the loss of revenue from reducing the rate of production. Even a small subsidy can tip the balance and cause inventories to increase or current production to decrease for the purpose of issuing guarantees.

The cost estimates of spare capacity and storage are imprecise and vary substantially. But even for those who believe that storage and spare capacity are prohibitively expensive, the OSS offers the advantage of resolving the uncertainty that surrounds this question. If storage and spare capacity are indeed too expensive, then setting up the OSS will have no effect on inventories and domestic production. But a failure of the OSS to increase inventories and spare capacity would discourage proposals in Senate bill S.1586 for strategic reserves of oil above and below the ground since this insurance will have been proved too expensive. If storage and spare capacity are not too expensive, as we believe, then the OSS will reduce the cost of importing oil without reducing oil security. Indeed, under many circumstances, replacement of an alternative oil import policy by an OSS would also increase oil security in the form of increased emergency oil supplies.

*Cabinet Task Force on Oil Import Control, *The Oil Import Question*, February 1970, pp. 54-55. For a more recent estimate see Professor Walter Mead’s testimony before the Senate Interior and Insular Affairs Committee on May 30, 1973. He estimates that oil storage would cost between \$.24 and \$.33 per barrel per year in salt dome cavities, \$.74 for steel tanks, and spare capacity at Elk Hills would cost \$1.19 per barrel.

**Senate bill S.1586 suggests that the U.S. Government create strategic reserves capable of replacing insecure imports for at least 90 days. A longer emergency supply period would raise the ceiling on the fee. If the emergency supply period is 180 days then the maximum fee importers will pay is \$.50 per barrel. If it is 365 days then the maximum fee is \$1.00 per barrel.

CURRENT ENERGY SHORTAGE WOULD WORSEN

Q. If your Oil Security System causes current production to decrease in order to create more standby production capacity, are you not just increasing and prolonging the current energy shortage?

A. Adopting the OSS instead of a fee-only import policy will increase both current and future oil supplies. The current oil supply increases because imports increase due to guarantees based on current emergency production capabilities and on inventories. Future oil supply increases because discovery of fields becomes more profitable and, once discovered, fields will remain productive longer.

Under any policy, total oil supplied must be the sum of domestic production plus imports. If the proposals in this paper are adopted, some companies will find it worthwhile to cut back relatively high-cost domestic production because, with this newly-created standby production capability, they can issue guarantees exchangeable for fee-exempt import allowances. But each decrease in domestic production enables imports to increase by the same amount. Total supply does not fall.

Moreover, additional imports on the basis of present oil inventories and emergency capabilities of current shut-in capacity, partially developed and undeveloped fields, and forced-draft additional production from fully developed fields, would not require an offsetting reduction in current domestic production. For example, one estimate says that domestic oil production at present could be increased by 900,000 barrels/day if all shut-in capacity were brought on stream.* Such capacity may be used under the OSS as a backstop for expanding fee-exempt imports without any necessary offsetting decrease in domestic production.

Future supply under the OSS would also be larger than future supply under the fee-only policy. First, discovery of a new field generates income to leaseholders before development of the field, because guarantees could be issued even if little or no development were intended in a non-emergency market for several years. At any given domestic price of oil, investment in exploration would be greater because of this incentive.

Second, the development of a field would also be more profitable because it would permit the issuing of more guarantees by providing the ability for faster and greater production increases in case of an emergency. Some exploration and development that would be unprofitable at a given price of oil will, under the OSS, be undertaken. The developed reserves can yield an additional early return, before production is maximized, in the form of import allowances.

Third, during the actual operation of a field the OSS creates an incentive for producers to prolong the field's lifetime by producing less than capacity in order to issue guarantees. Producers will also be more likely to "unitize"—agree on a drilling policy designed to maximize total profits from the field—if failing to unitize causes the individual well owners to lose much of the revenue from guarantees.

*An informal estimate given in May 1973 by a spokesman for the American Petroleum Institute.

Finally, at the point in time where a well would normally be shut down, the well owner would keep the well uncapped or, if he caps the wells, avoid scrapping completely the pumping equipment and gathering system if the profits from the guarantees approved by the government are greater than the scrap value of his equipment.

In sum, current and future supply must be greater under the proposed OSS than under the fee-only import policy outlined in the April 1973 Energy Message.

WOULD NOT CONSERVE DOMESTIC RESERVES

Q. The incentive to issue guarantees in order to acquire fee-exempt import allowances depends on the size of the fee. If the fee is large enough to encourage exploration and cutbacks in production in order to issue guarantees, then it will also discourage imports. But shouldn't we be importing more in the near future in order to conserve domestic reserves for the farther future when they will be needed?

A. There would be more imported in years immediately ahead under the OSS than under a fee-only import policy or S.1586 because issuing fee-exempt import allowances for oil storage or spare capacity reduces the cost of imports and encourages cutbacks in domestic production. The decrease in domestic production and the increase in imports will conserve more U.S. oil reserves without risking a temporary interruption in oil supplies during an emergency. Increased conservation of domestic reserves and intensified exploration of unleased land will reduce the cost of oil security in the future.

The analysis in the question above confuses the OSS with the fee-only import policy. Under a fee-only policy a higher fee will drive up the domestic oil price and increase domestic production. In contrast, under the OSS, for an increase in the fee to have an effect, some importers would have to find paying the fee cheaper than purchasing fee-exempt import allowances before the increase. Otherwise, importers would not pay the higher fee but continue to buy fee-exempt import allowances. Even if a higher fee does increase the domestic oil price, the effect of this higher price on current domestic production is uncertain under the OSS. On the one hand, production becomes more profitable. On the other hand, fee-exempt import allowances are also more valuable and the increase in the demand for these allowances will cause the prices of guarantees to rise. Higher guarantee prices encourage companies to produce more guarantees by cutting back current production in order to create more unused production capacity.

In conclusion, under the OSS a higher fee could increase the prices of guarantees and the price of oil. An increase in the price of oil creates an incentive to produce more domestically, while higher guarantee prices encourage a cutback in domestic production. The effect of the fee increase within the OSS on domestic production and imports depends on the relative strength of these two incentives.

BALANCE OF PAYMENTS

Q. The U.S. dollar has been repeatedly devalued because in recent years the United States has bought and invested more overseas than foreign countries buy from or invest in the United States. By 1980 the United States might be spending more than \$30 billion a year for oil imports. How can we import more oil without increasing the size of this deficit?

A. As has been emphasized repeatedly by economists critical of the balance of trade argument, if foreign oil producers do not want dollars, U.S. goods, or investments in the U.S. economy, they will, on their own initiative, decide not to sell oil to the United States. These producers do not need the U.S. Government to tell them when they are selling too much oil to the United States.

Some commentators have argued that the Arabs are accumulating a hoard of dollars as a weapon to use against the United States. But this flies in the face of logic and past experience. By holding huge reserves of dollars the Arabs would find it more rather than less difficult to use dollars as a weapon. Dumping dollars on the world money markets would devalue their wealth. The past monetary policies of the large oil exporting countries in the Middle East, i.e., Saudi Arabia, Iran, Kuwait, etc., have been very conservative.

Investments in the United States tend to tie the oil producing countries to the U.S. economy. If these countries have large investments in the United States, then any action that slows the U.S. growth rate also reduces the rate of return on their investments. Investments in the United States by foreign oil producing countries have the added advantage for the United States of producing hostages for American investments overseas. If a foreign government nationalizes investments by American companies then the U.S. Government can nationalize investments from that country in the U.S. economy.

This paper assumes that the only reason for interfering with free trade is security. Therefore, if foreign oil producers buy more goods and services from the United States because the United States imports more oil, both U.S. consumers and consumers overseas are better off.

But the United States might conceivably import more oil at a lower total cost under the OSS. If adopting the OSS, which involves an effective ceiling on the fee that can be placed on U.S. oil imports, should encourage more competition among foreign oil producers for the U.S. market, then the price of imports could fall. The potential price cuts are indeed great. According to M. A. Adelman's recent study *The World Petroleum Market*, \$.20 per barrel is a high estimate of the full cost of producing oil in the Middle East. But the arms-length price of crude loaded in the Persian Gulf in September of 1973 was close to \$3.00 per barrel.

If there were more competition among foreign producers for the U.S. oil market, and if the resulting percentage decrease in the price of Middle Eastern oil were greater than the percentage increase in imports, then total foreign exchange costs of oil imports would be less than the costs under current policies.

But even if the world price of oil continues to increase, and the United States continues to import oil, the OSS could eventually decrease the long-run foreign exchange cost of imports. Under the OSS more is imported and less is produced domestically than under a fee-only import policy. But reducing the rate of domestic production now conserves future U.S. oil reserves. Increased future U.S. oil reserves, caused by replacing the fee-only import policy with the OSS, could eventually result in an increase in future U.S. oil production and a decrease in future imports. If the world oil price rises over time, this means that imports will be higher when the price of imports is relatively low and imports will be lower when the price is relatively high. The immediate increase in payments for imported oil could be less than the present value of the future decrease in the payments for imports and, thus, foreign-exchange cost could be lower in the long-run under the OSS.

COST OF IMPORTED OIL GREATER THAN DOMESTIC OIL

Q. Your proposal assumes that import allowances will be valuable in the future and companies will store oil or create standby production capacity in order to acquire them. Currently, imports cost more than domestically-produced oil. What would happen in this situation under the OSS?

A. If there is a fee on imports and someone imports oil, then a fee-exempt import allowance will be valuable. Studies of U.S. oil consumption without exception predict significant amounts of oil imports in the future.

But why do some consumers pay a fee to buy oil overseas that is supposedly cheaper in the United States? Some analysts question whether U.S. oil imports are in fact more expensive than domestically-produced oil. They point out that prices often quoted for imports are taken from the spot market, which accounts for a small proportion of imports. In 1973 spot market prices as an indicator of the future cost of importing oil have also been distorted by a temporary jump in single-voyage tanker rates.

However, the present controls on the price of domestically-produced crude oil can explain why the spot price of oil on the world market could be higher than the observed price of domestic crude. In this case buyers are prevented from paying as much for domestic oil as they pay for imported oil, even though to get more oil many buyers would be willing to pay a price for domestic oil at least as high as the price of imports plus the import fee.

Regardless of the explanation advanced, if the United States continues to import oil and simultaneously to tax imports, then fee-exempt import allowances will be valuable.

MILITARY INTERVENTION WOULD BE CHEAPER

Q. Wouldn't spending more money on the military be cheaper than accumulating reserves of oil, creating spare capacity, and paying taxes on imports? In case of an interruption in oil flows, the United States might be able to force a resumption of oil exports by intervening or threatening to intervene militarily in the Middle East.

A. Direct military intervention will often be the wrong answer to the problem of the vulnerability of U.S. oil imports to interruptions. Many times in the past, governments have underestimated the cost and overestimated the benefits of such intervention.

However, military intervention in oil producing countries can take place under any oil import policy. Under the OSS the government could test its foreign and military policy against the reactions of companies insuring against an interruption in U.S. oil supplies. For example, the stationing of more carriers in the Mediterranean could be defended or criticized depending upon its impact on the price of oil. If companies issuing guarantees found this military presence reassuring, then they would be less reluctant to issue guarantees and the cost of importing oil would fall. If guarantee issuers found the prospect of increased U.S. military involvement in the Middle East unsettling, then they could be more reluctant to issue guarantees and the cost of imports would increase.

COST OF PREPARING FOR EMERGENCY

Q. Wouldn't it be more efficient for the government to collect information about inventories and spare capacity after an emergency starts and then determine the least costly way of replacing oil imports?

A. The government might not be able or willing to find the least costly way of replacing imports after an emergency starts.

The OSS encourages companies to store more oil, create more spare capacity, and explore unleased land before the emergency. After an emergency takes place it is too late to try to increase inventories and there might not be sufficient time to explore and develop unleased public lands, or even to expand production without prior commitments and preparation.

The guarantees provide the government the latest information about the location of inventories, spare capacity, and potential wells on unleased land. This information might not be accurate or even available if the government waits until after the emergency starts. Companies would be reluctant to tell the government exactly the amount of oil in their inventories, if they felt that the government would use this information to force them to share oil with competitors. Companies would have an incentive to exaggerate production costs and understate the amount of production possible if they felt the government might force them to produce more than they would choose to produce. Finally, the government is not a flawless computer, objectively calculating the least-cost method of replacing imports after an emergency starts. Even with accurate information and sufficient time, the government would make mistakes due to normal human error and political pressure.

Under the OSS the cost of government mistakes is reduced by delegating much of the detailed decision-making to the market. Before an emergency, businesses issue guarantees which, once the emergency takes place, determine the dates on which individual oil suppliers will have to supply more oil. After the emergency starts businessmen who make mistakes can pay other companies to exchange dates.

The publication of emergency scenarios provides an added check on the accuracy of business decisions. If repeatedly in emergency scenarios the consequences of the government policies derived from business decisions about guarantees would be wasteful, then more authority can be given to the OSC.

Preplanning in the OSS buffers the government from political pressures. Before the emergency many of the businesses that would normally resist being forced to supply more oil will issue guarantees because it benefits them. After the emergency starts these businesses will find it more difficult to translate their political power into special treatment because of the existence of guarantees.

Of course, an alternative to government intervention in the oil market in case of an emergency is for the government not to intervene at all. Then the necessary adjustments would result from higher oil prices inducing both consumption cut-backs and supply increases from inventories, higher-cost production, and accelerated development. Further, with this expectation the market in advance of an interruption would solve the preparation problem with insurance actions, such as storing oil, induced by the expectations of return in an emergency. But if it is widely believed that

the government will intervene in an emergency, then there will tend to be less insurance under free trade than under the OSS.

TOO MANY BUREAUCRATS—TOO MANY INEFFICIENT WELLS

Q. Won't your proposal encourage needless drilling of marginally profitable wells and employment of more bureaucrats at no benefit to oil consumers?

A. One man's "waste" is another man's "national security."

If someone feels that the national security argument is simply a ruse for extracting higher prices over the long-run from American oil consumers, then by that opinion any effective security system is wasteful because it provides insurance against nonexistent risks. But for years an important segment of the population has apparently felt that oil security is important. For many observers, the lesson of the current Arab embargo on oil for the United States is that oil security will not be less important in the future, to say the least.

If a majority of the voters have opposed free trade, those favoring free trade should support the OSS as a lesser evil because a fee-only import policy will permit more restraint of trade than the OSS. Under the fee-only import policy all importers must pay the fee. The domestic oil industry can lobby for a higher fee on grounds of national security. But under the OSS the importer can choose between paying the fee and buying a fee-exempt import allowance. The price of the fee-exempt import allowance depends on the cost of proving that there exist adequate additional oil supplies to replace imports vulnerable to interruption in an emergency. If businesses would provide much of such insurance anyway without government intervention, then proof that the emergency oil supplies exist should be inexpensive and easy to obtain. Importers would buy fee-exempt import allowances instead of paying the fee. The price of the fee-exempt import allowance would be just sufficient to cover the administrative cost of the OSS. Attempts to restrain trade by supporting higher fees on imports would be ineffective because none of the importers would pay the fee.

INDEPENDENT REFINERS WOULD SUFFER

Q. The April 1973 Energy Message promised that import allowances, as allocated under the Mandatory Oil Import Control Program, would be gradually phased out over the next six years. Wouldn't you have to suddenly eliminate these allowances at great cost to independent refiners in order to create room for the fee-exempt import allowances issued under the OSS?

A. Under the OSS the government may auction off fee-exempt import allowances for some of the secure imports. The problem of transition can be solved by reducing the fee-exempt import allowances that would be auctioned under the OSS by the amount of fee-exempt import allowances given to independent refiners under the MOICP. The MOICP allowances could be phased out by gradually decreasing the number of fee-exempt import allowances given to refiners and increasing the number auctioned.

THE EFFECTS OF THE OIL SECURITY SYSTEM

Substituting an OSS for a fee-only import policy, an import quota, or a system of publicly-financed strategic reserves could affect the cost of importing oil, current and future oil security, the competition among oil-exporting countries, the U.S. balance of payments, and the flexibility of the U.S. import policy. In general the effects are desirable because they are in the interests of U.S. oil consumers.

COST

The cost of importing oil could be reduced. If the OSS replaces a fee-only import policy or an import quota, the size of the fall in the cost of importing and the amount of additional imports will depend upon two factors: the gap between the price of imports and the highest-cost domestic production before substitution of the OSS; and the cost to oil suppliers of increasing emergency oil supplies under the OSS. The greater the gap relative to the cost of emergency oil supplies, the greater will be the fall in the cost of importing and the downward pressure on domestic oil prices. If the OSS replaces publicly-financed emergency supplies, the cost of oil security would also be reduced if private firms can provide part or all of the emergency capability cheaper than the government.

Perhaps more significant for consumers of energy than an immediate fall in the cost of importing and in domestic oil prices is a constraint an OSS would place on their increase in the future. This is an effect of an import policy that precludes the future misuse of restrictive fees and quotas. For almost 20 years powerful voices championed the oil import quota. Either a quota alone or a tariff alone results in greater demand and higher prices for the domestic product and its close substitutes. History tells us there will be pressures for import restrictions for as long as some oil can be imported more cheaply than additional energy can be produced domestically. In this climate an import policy that uses an import fee or quota alone to take account of oil insecurity is likely to be vulnerable to future attempts to push up the fee or reduce the quota in the name of "national security." This is because there is no test of the justification of a proposal for increasing import restrictions to increase security.

The OSS provides this test. It offers the option to exempt imports from the restriction by permitting increased imports on the basis of increased emergency supplies. If the import fee is then raised above the cost of increasing emergency oil supplies there will be no further drop in oil imports. In an earlier numerical example, if the emergency supply period were 365 days and the incremental cost of emergency oil storage were \$1.00 per barrel per year, then the quantity of imports would not be reduced at all if the fee were set higher than \$1.00 per barrel because no imports would bear the fee. No higher fee for the purpose of oil security can be justified because all insecure imports carry the visible backing of adequate emergency supplies. Adherence to the OSS thus precludes the future use of restrictive tariffs and import quotas to maintain artificially high domestic oil prices and to stimulate excessive production from high-cost domestic energy sources.

Of course, restrictionist attempts can be directed to other pressure points. As noted earlier, the longer the emergency supply period, the smaller the quantity of imports. From the viewpoint of energy cost to the consumer, the virtue of placing the burden on the selection of the emergency supply period is that the choice directly involves a trade-off between measurable oil imports and

measurable oil security. As outlined in the section "Administering the Oil Security System," emergency scenarios could be constructed to expose the effects of choosing different magnitudes for the emergency supply period.

OIL SECURITY

Applications for guarantees would provide the government with detailed information about the capacity of companies to supply oil in an emergency. The guarantees used to acquire fee-exempt import allowances would be the basis of an emergency plan specifying where oil would come from and when it would be supplied. Oil storage and other emergency supply capability would be low-cost selections by firms who know the costs of their options and have an incentive to minimize costs.

Replacing a fee-only policy or a quota would increase both current and future oil security. The opportunity to get valuable fee-exempt import allowances for guarantees of emergency oil supplies would create an incentive to store more oil, increase spare production capacity, and explore still unleased land. These greater emergency oil supplies increase current oil security.

The opportunity to issue guarantees against spare capacity creates an incentive to cut back the highest-cost domestic production. The decline in current domestic production would not cause a reduction in the ability to produce because that ability must be maintained in order to issue guarantees. A reduced rate of current production from known oil reserves means that there would be more oil available in the future under the OSS than under the replaced import policy. Furthermore, the additional incentive to explore unleased public land in order to issue guarantees implies that under the OSS there will be more information about potential production in an extended emergency than under a policy that rewards a company for exploration only after actual leasing, development, and production.

COMPETITION

The competition among the world's oil producers for the U.S. market could increase.

Under a fee-only U.S. import policy or an import quota, producers abroad have little incentive to decrease their prices and risk competition among themselves. An import quota keeps the quantity from increasing in response to a reduction in price. A fee-only import policy permits an increase in the quantity of U.S. imports, but oil-exporting countries know that under such a U.S. policy a significant decrease in the price of oil imports might well cause the U.S. Government to increase the fee on imports to restrain the increase in quantity. Otherwise, the lower import price would cut into the profits of domestic oil producers, wells would be closed down, and domestic exploration efforts would decline. Both those concerned with national security and those benefiting from a large domestic crude oil industry would probably demand a fee increase to protect domestic oil producers from cheap imports.

But under the OSS a decrease in the price of imports, by making importing more attractive, will cause an increase in the demand for fee-exempt import allowances if the price of the fee-exempt import allowance is below the import fee. This will increase the demand for guarantees of emergency oil supplies and companies will find storing oil, creating standby production capacity, and exploring unleased public lands more profitable because the revenue from guarantees has increased. Therefore, portions of the domestic oil industry will not close down but will shift from

immediate production to maintaining emergency oil supplies, whenever the price of imports falls sharply under an OSS. If the U.S. Government, nevertheless, should respond to a decrease in the price of imports by raising the import fee, it will have no effect on imports, in contrast with the effect under a fee-only import policy. Under an OSS, in this situation importers would always find it cheaper to buy fee-exempt import allowances than pay the fee. Therefore, with an OSS foreign oil producers will have a stronger incentive to lower the price of imports.

BALANCE OF PAYMENTS

Lowering the cost of importing oil should increase imports. Normally an increase in imports would result in greater U.S. expenditures abroad and a tendency toward a smaller surplus or larger deficit in the balance of payments. But the price of oil in the Middle East in September of 1973 was already more than 20 times greater than the full economic cost of production. With price so far above cost, and with oil-consuming countries turning to alternative energy sources, it is still possible that in the future, individual oil-producing countries will feel enough incentive to shade the cartel price in order to get a larger share of the world energy market and still larger profits. If a number of countries attempt to do this, a major fall in price could ensue. Although replacing the fee-only policy or the quota with the OSS would increase imports, there is some chance the effects on the balance of payments will be dampened in a world oil market made somewhat more susceptible to competition by an OSS.

But if a deficit temporarily arose in the U.S. balance of payments, the dollars must return as investments in the U.S. economy or as purchases of goods and services in which the United States has a comparative advantage.*

FLEXIBILITY

Under the fee-only import policy the government must decide when changes in the cost of dependence on foreign oil justify increasing or decreasing the fee. The government must make this decision under pressure from special interest groups that want the fee increased or decreased.

Under the OSS private businesses would place guarantees in the market, or withdraw them, depending on their perception of the risks and the costs of insuring against these risks. The emergency plan that the government would use if imports were interrupted, and the cost of importing oil by purchasing fee-exempt import allowances, will be more flexible because of the greater reliance placed on business decisions.

*See also p. 47.

GLOSSARY

District Used in the paper as a short title for Petroleum Administration for Defense (PAD) District. These districts (I through V) define geographical regions of the United States, e.g., District I is the east coast and District V the west coast.

Emergency Lease Time The minimum length of time an emergency must last before the Oil Security Corporation (OSC) can lease the land for production (see p. 13).

Emergency Plan A plan used to assure oil supplies for the U.S. economy during any plausible interruption in importing. The plan is based on the commitments made by oil suppliers issuing guarantees and the ability of the OSC to mobilize uncommitted oil supplies, ration, and persuade companies to convert to alternative sources of energy (see p. 28).

Emergency Scenario A detailed description of the OSC's estimate of government action to be taken in an oil import interruption. The scenario also outlines the probability of occurrence of different emergencies and the effect of each emergency on the economy. It allows public scrutiny of the government plans prior to an actual emergency (see p. 15, 39-40).

Emergency Supply Period The number of days of oil supplies the OSC feels are needed for adequate insurance against any plausible interruption of imports (see p. 19).

Fee-Only Import Policy An oil import policy which would only admit oil imports on the payment of a fee. All other oil import restrictions would be removed (see p. 2).

Future Dates The dates specified on a guarantee which define the calendar dates in the future on which the issuer of a guarantee could be directed by the OSC to supply oil in an emergency (see p. 10).

Guarantees A statement of an obligation to the OSC, made by the issuer of the guarantee, to supply oil in an emergency from such sources as inventories, capped wells, existing wells operated below capacity, new wells drilled during the emergency, and U.S. exports of oil products (see p. 7-15).

Guarantee Right A guarantee that is issued for emergency production from unleased land (see p. 13).

Import Allowance A short term for fee-exempt import allowance, the permission to import oil without payment of an import fee.

Import Fee A per-barrel fee on all oil imports not covered by a fee-exempt import allowance. This fee is intended to account for the possibility of an interruption in oil imports and the consequence for the economy of such an interruption if there are inadequate emergency oil supplies (see p. 16).

Minimum Emergency Length The minimum time on a guarantee that an emergency would have to last before the issuer of the guarantee can be compelled to supply the oil guaranteed (see p. 9).

Minimum Lead-Time An OSC estimate of the minimum time needed by the issuer of the guarantee to be able to produce the oil and transport it (see p. 9).

Oil Security Corporation A hypothetical organization under the Oil Security System which carries out all government action affecting oil security (see p. 6).

Oil Supply Date The dates specified in a comprehensive emergency plan, on which the OSC expects the issuer of a guarantee to supply the additional amount of oil required under the emergency plan (see p. 28).

Overestimates of Guaranteed Oil An estimate on a guarantee that indicates there is more emergency oil than can in fact be supplied. Such an estimate causes the oil security provided by the guarantee to be partly illusory. Companies making such estimates are fined by the OSC (see p. 35).

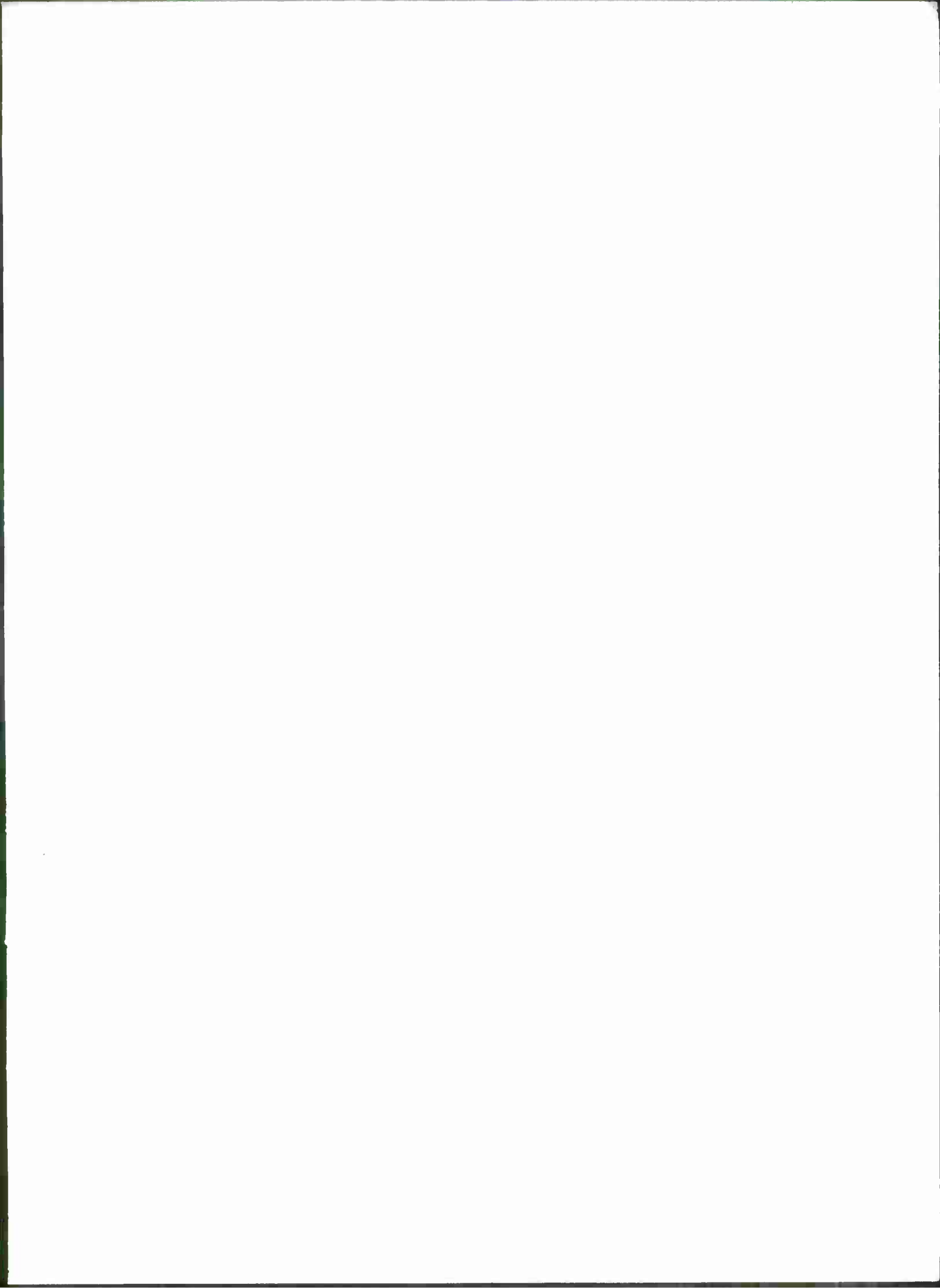
Preparation Start Date During an emergency it is the date assigned by the OSC on which the OSC expects the issuer of the guarantee to start or already have started preparation in order to be able to provide the oil guaranteed by the supply date (see p. 31).

Refinery Capacity Charge A special tax levied by OSC on all exchanges of import allowances of refined oil for guarantees of crude in districts that might have a shortage of refinery capacity in a plausible emergency (see p. 21).

Replacement Date The date on a guarantee on which the company must replace the oil supplied from its inventories during an emergency (see p. 10).

Secure Imports That amount of oil that would continue to be imported in any plausible emergency (see p. 25).

Underestimates of Guaranteed Oil An estimate on a guarantee which specifies a lower amount of emergency oil than in fact can be supplied. Subsidies are paid only if the company specifies on the guarantee how they plan to supply the oil (see p. 36).



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CENTER FOR NAVAL ANALYSES

1401 Wilson Boulevard
Arlington, Virginia 22209